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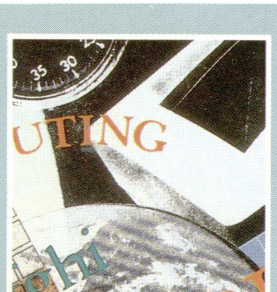
OCTOBER 1988

- Creating Technical Illustrations
- Logic Programming: The Basics
- MPE/XL: Tricks Of The Trade



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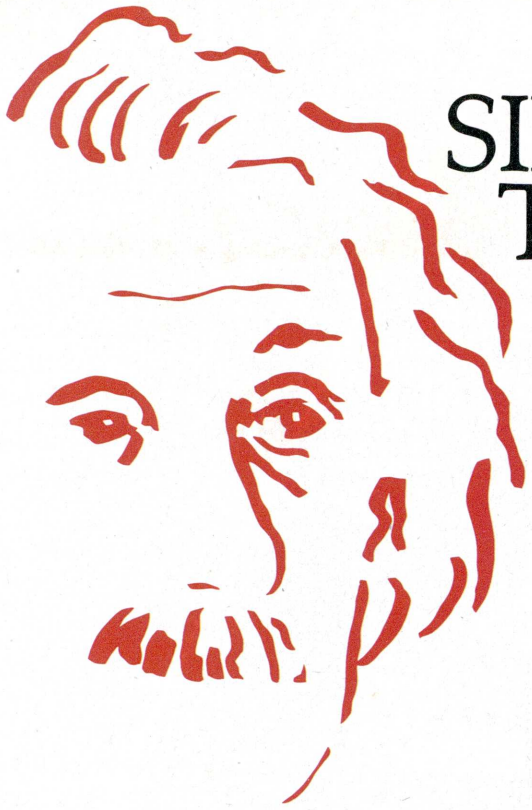

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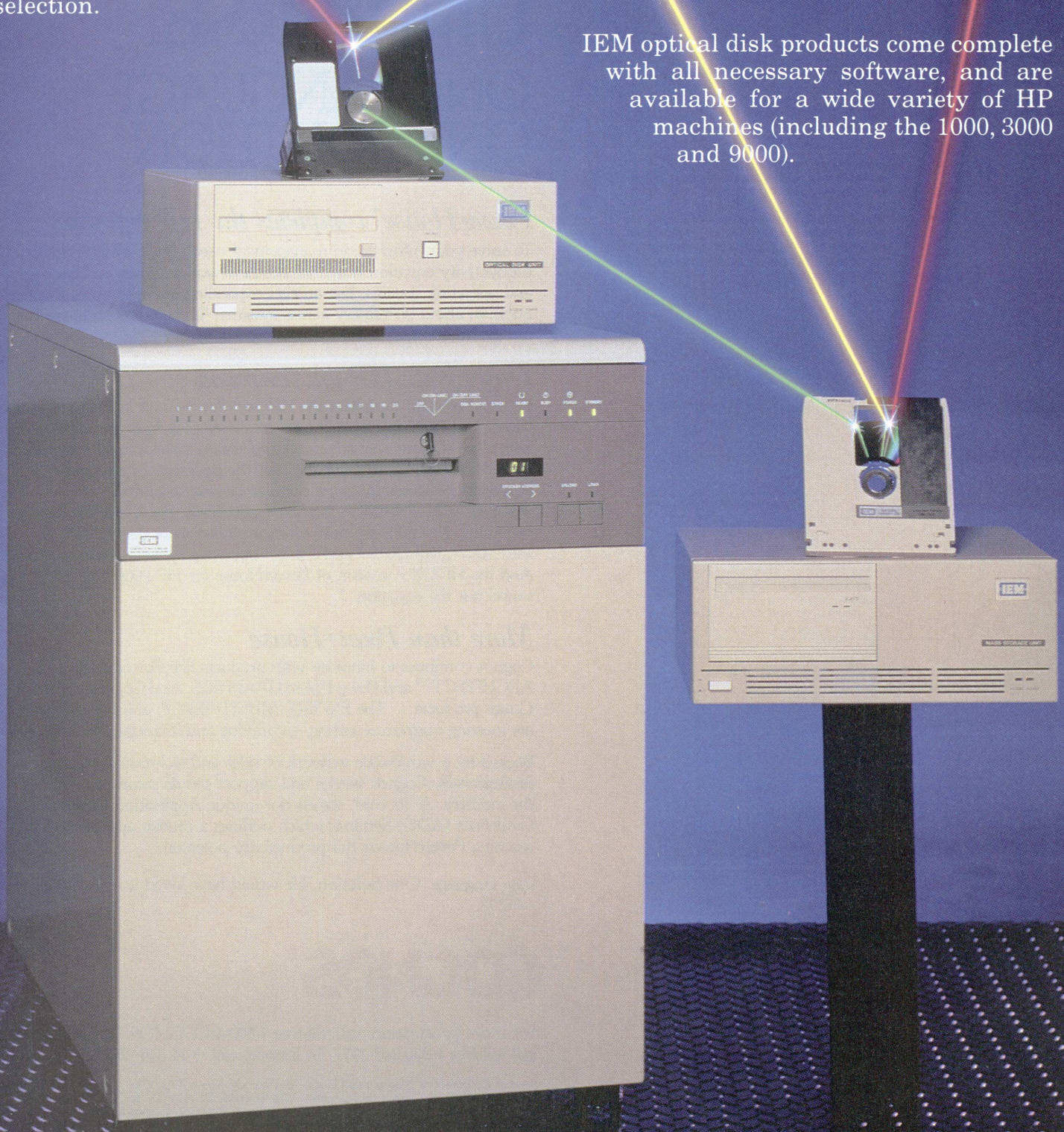

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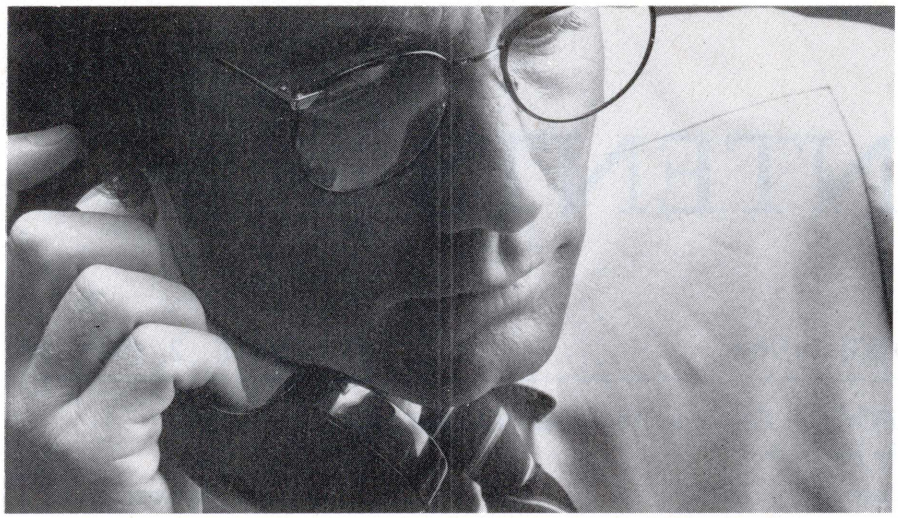

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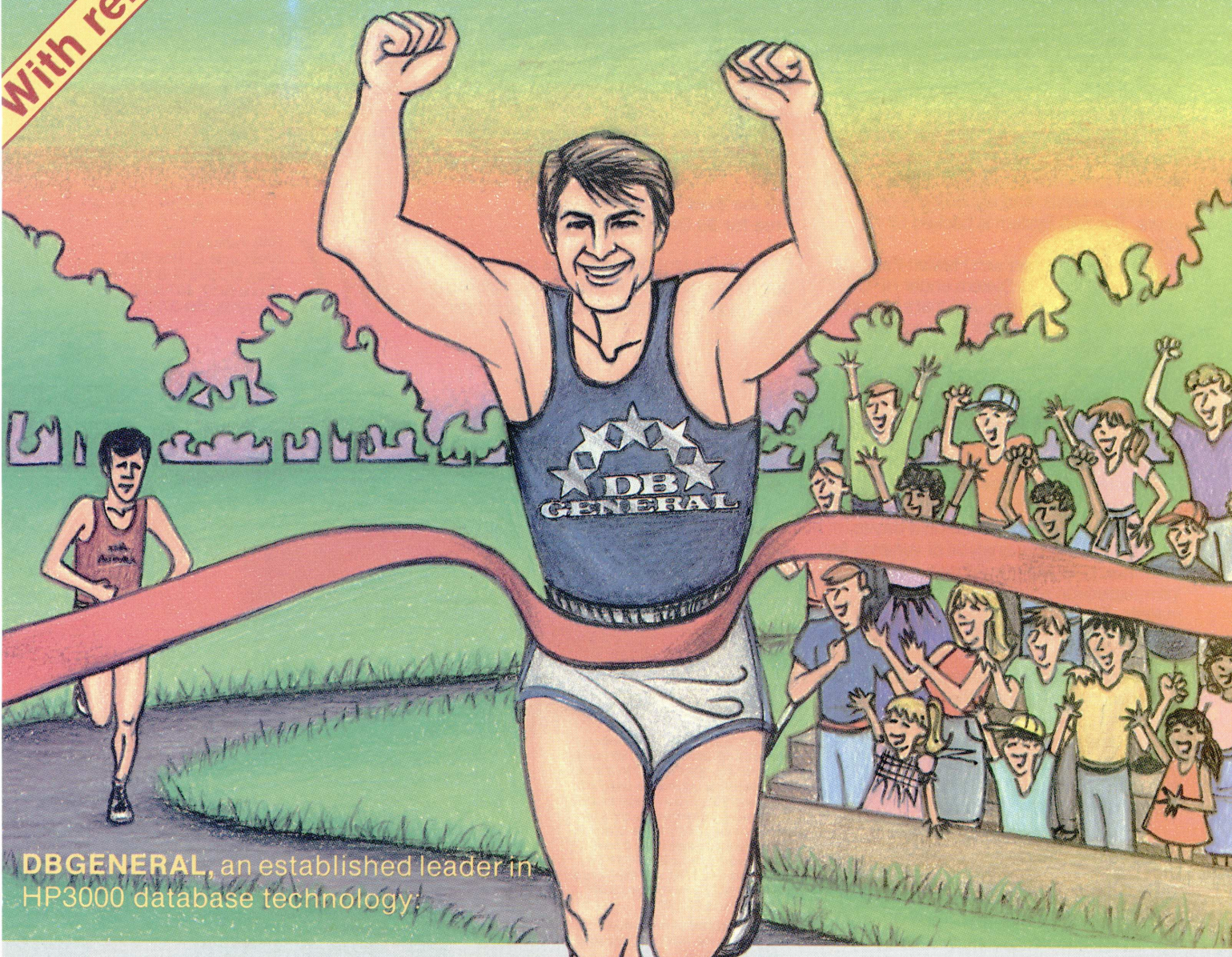

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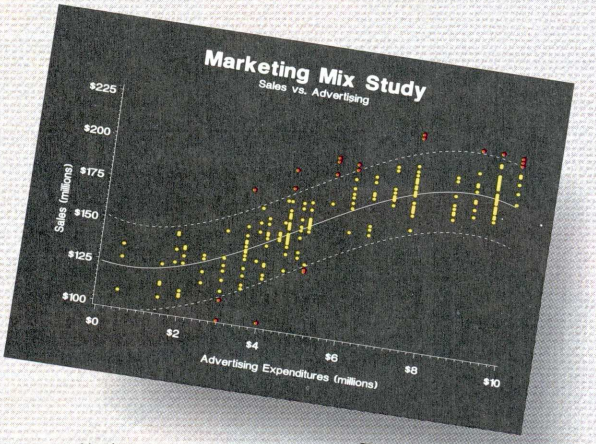

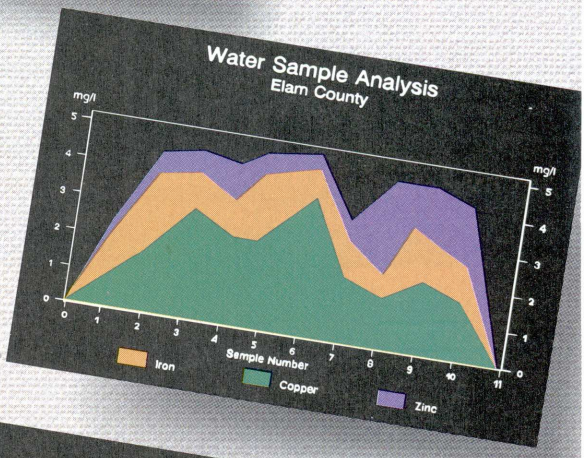

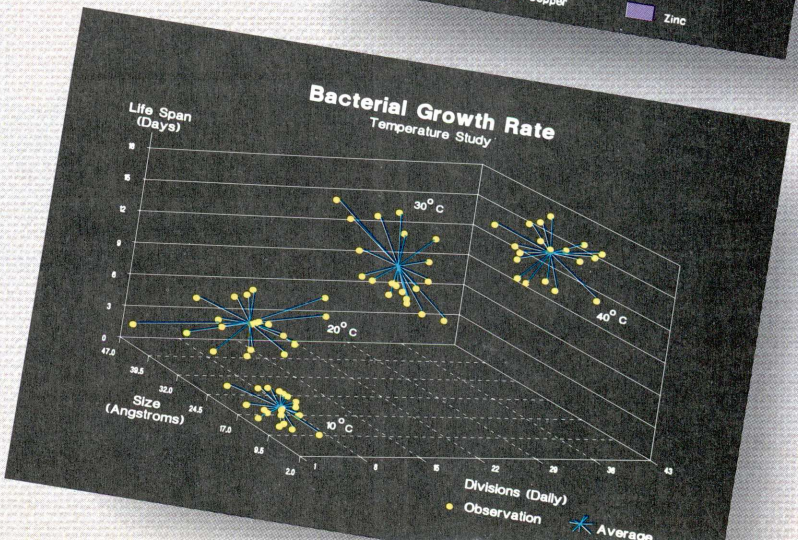

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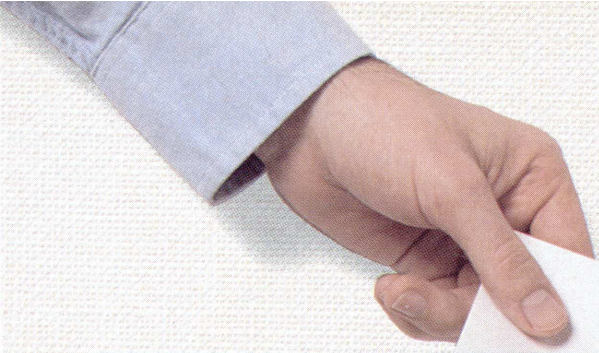
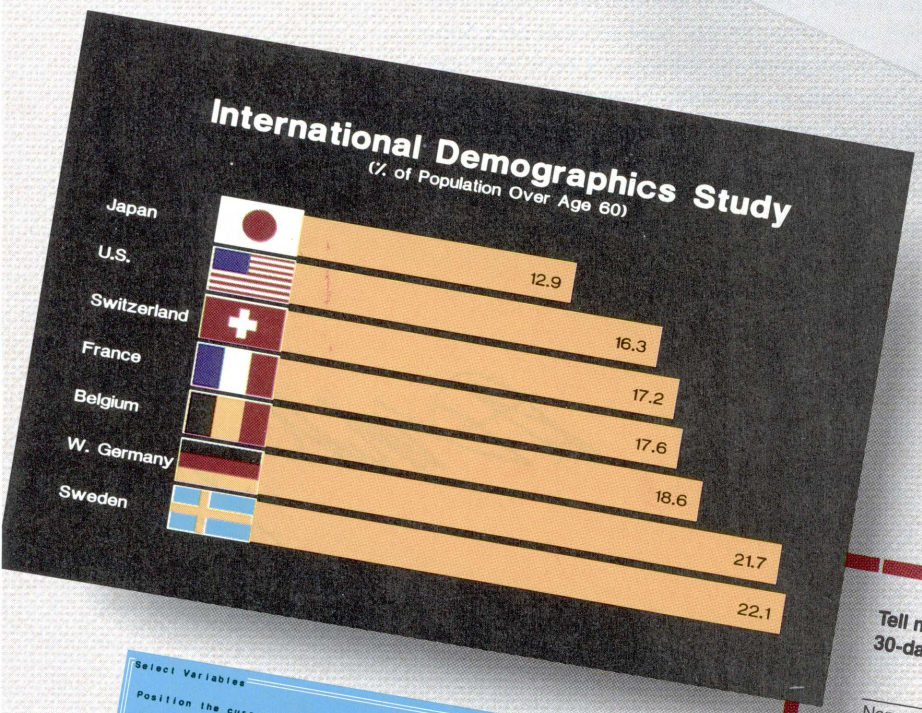
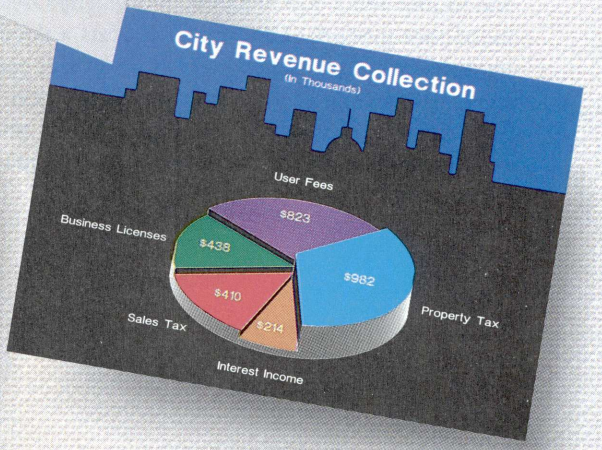
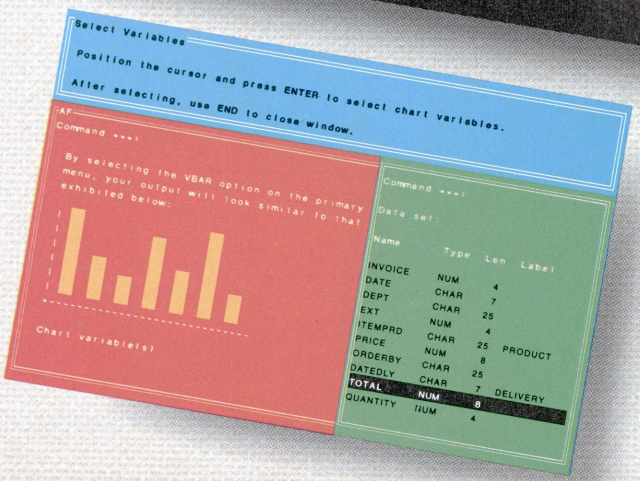


Revenue Collection Comparison
1986 vs. 1987
(In Thousands)

SOURCE	1986		1987	
Business Licenses	$420	15%	$438	15%
User Fees	$792	28%	$823	28%
Property Tax	$947	34%	$982	34%
Interest Income	$207	7%	$214	7%
Sales Tax	$397	14%	$410	14%
Total	$2,763	100%	$2,867	100%







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Delivery Day For Our HP 3000/37

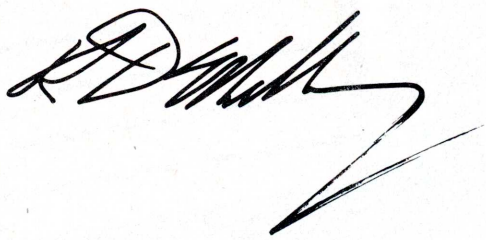
Our HP 3000/37 has arrived. One small step for our company, but a very important one. Starting right now, we will be doing in-house evaluations of both hardware and software. Right here, on our own machine. The Spectrum 825 will follow, but buying that is far more traumatic than the lowly 37. As I pointed out before, it seems ludicrous for me to have to buy two physically identical CPUs in order to run two operating systems. (I grant the difference in terminal interfaces, but that's the ONLY difference!)

I am not alone with this beef. Every software firm I talk to shares the same problem. They would like to be able to run MPE and HP-UX to work on porting their applications, but they are being squeezed to buy a second $100k+ machine. Makes no sense to me to put the squeeze on the very developers you rely on for software.

See How They Run

Speaking of hardware, if you have been watching the workstation market, there is a real rat race developing. Seems that the state of the art is about 16 mips in a box that costs about a third of a comparably configured VAXstation. So true that DEC bought a share of the Sunnyvale, California-based Mips Computer Systems, and scuttled its own several-year-old RISC project. A friend who runs a Mips workstation confirms a 30-to-one price performance advantage. Specifically, a benchmark that consumed 15 seconds on a MicroVAX II, nine seconds on a Sun, ran in one and a half seconds on the Mips box (and even faster on subsequent runs once the cache was primed). The Mips box costs a third of the price of the VAX. Now for those odds, even a worm will turn. The view from this cat bird seat says that many fine architectures are in for some serious price pressure in the next few months.

There is no magic in the mips. Simply, whether the majors want it to be true or not, the next generation is here. Selling 3-MIP RISC machines for $100k is going to get really difficult. Comments?



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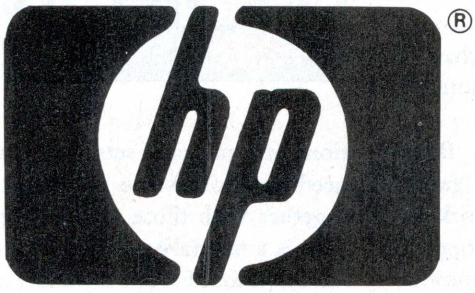

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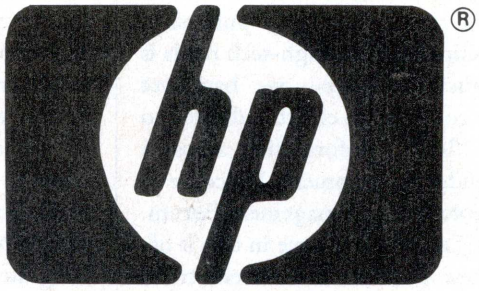

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INDUSTRY WATCH

Ann Marie Lasak

What Impact Will OSI/NM Have On Multivendor Networking?

High-Tech Rivals Form OSI/NM

Editor's Note: The following information was gathered at a July 27, 1988 press conference held live in New York and via satellite in London and Toronto. The press conference was held to announce the OSI/Network Management Forum.

In a time when well publicized partnerships between high-tech rivals is very much in vogue, we have yet another cooperative effort dedicated to the free flow of information across a multivendor environment. Welcome to the OSI/Network Management Forum.

The OSI/NM is unique in that it offers a new twist to the current trend toward computing standards. The OSI/NM is not interested in setting the standards. Rather, the OSI/NM is interested in implementing these standards as quickly and as beneficially as possible.

Network management is the ability — through hardware and software — to identify, monitor and control network reliability, configuration, security, accounting and performance. OSI/NM seeks to simplify network management for customers.

OSI/NM is interested in implementing the standards established by the Open Systems Interconnection (OSI). OSI is dedicated to standardizing protocols — the common procedures and formats that are required before two or more computer systems can communicate successfully. It also is aimed at providing users with flexibility in selecting and configuring equipment and systems, regardless of vendor, to handle their specific applications.

OSI/NM, made up of leading computer and telecommunications companies including Hewlett-Packard, represents the first time these two groups have formed an alliance to develop and promote an OSI application.

Eight companies — Amdahl Corporation, AT&T, British Telecom, Hewlett-Packard, Northern Telecom, Telecom Canada, STC PLC and Unisys Networks — represent the Forum's charter members. Membership is open to additional members. More than 20 organizations were expected to join the Forum within the first week.

Speaking for the Forum, Brian Hewat, director of Telecom Canada, spelled out the benefit of its work for users: "Many companies today operate integrated computing and communications networks that combine the products and services of different vendors. They invest thousands, often millions, of dollars in these systems and networks each year. It is critical to their business success that these diverse systems work together efficiently.

"This is where the Forum can bring real benefits to customers," said Hewat. "Its members are committed to ensuring that their network management products and services can work together — and do so as quickly and as comprehensively as possible."

Hewat said that Forum members have pledged that their companies will implement existing OSI standards, as well as contribute to the further development of those standards.

"Some aspects of OSI still need to be fully worked out. But we need to find a means to address customers' network management needs now," he said. "And we must ensure that any solution allows them to move easily to the final standard.

"The principle task of the Forum will be to supply the specific implementation information, such as protocol options and message sets that designers need now to develop products that fit together with those of other vendors. This is a natural extension of the contribution that Forum members already make to standards committees."

OSI/NM FORUM

The Forum's first effort will be to agree upon a set of network management options within each of the seven layers of the OSI model. Vendor members then will have the opportunity to implement these options with the objective of demonstrating interoperability in customer networks in about 18 months. The Forum's work could reduce product delivery times by as much as two years.

Hewat concluded: "The Forum serves as a facilitator; it will not be creating any products. Responsibility for developing interoperable network management products will continue to rest with each vendor."

Forum Organization And Officers

The Forum, an open non-profit corporation, is inviting other computing and communications suppliers and users to join in this effort. Its work plan will be set up by a board of Trustees, to be elected annually by its members. There

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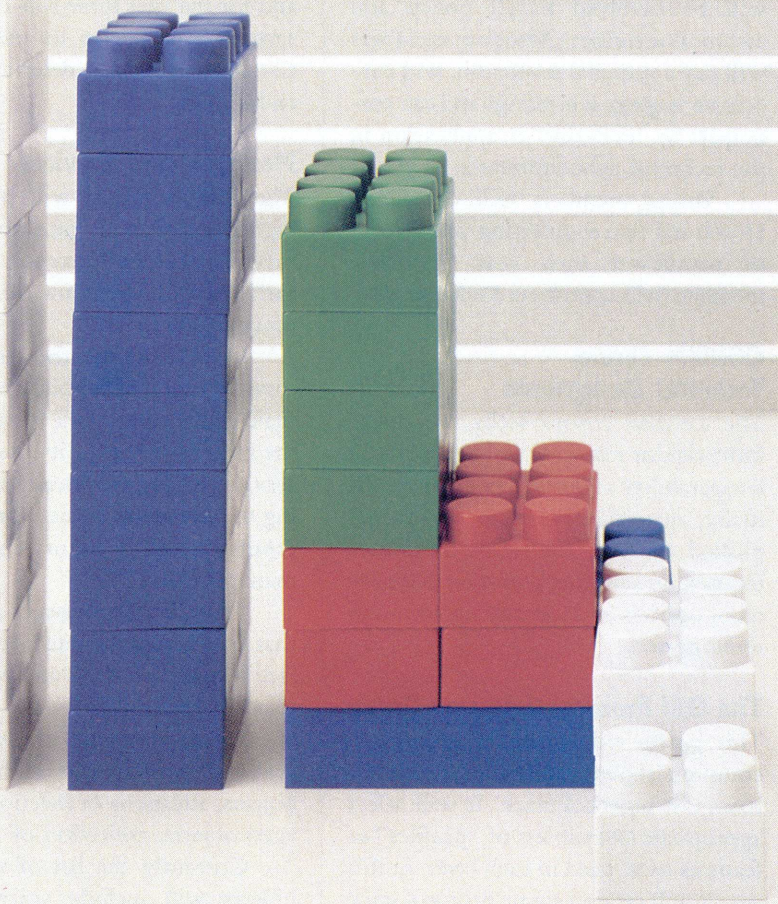

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will be three teams in the Forum to address technical issues relating to multivendor network management.

All members will have access to documentation produced by the Forum and will be informed fully of its programs. This information also will be made available to the industry in general.

The Forum will have two types of membership. Voting members will invest capital and human resources and will be involved in all policy and technical activities. Associate members will pay a nominal fee to join, will participate in general meetings and can participate by invitation or application in the technical subcommittees.

Voting members will contribute $40,000 and two engineering years worth of manpower each year. Associate members will contribute $5,000 per year.

OSI/NM Forum Technical Background

The OSI/NM Forum seeks to achieve multivendor network management interoperability as quickly as possible. Initially, this objective is to be accomplished through the work of groups focused on selecting common OSI protocol options and identifying common message sets.

The OSI Protocol Selection Group

This group will agree on selecting a common implementation of the seven-layer OSI protocol stack. It will select appropriate OSI subsets of "profiles" of features to be used in each layer. In this way it will create a single protocol stack in order to ensure interoperability between different management products and systems.

Within the first three layers, for example, the Forum expects to adopt the X.25 wide-area network standard of the International Commission for Telephones and Telegraphs (CCITT) and the 802.3 IEEE standard for local-area networks. It could examine other transport methods later.

As an example of upper-layer activity, the Forum is planning to adopt the draft OSI proposal for Common Management Information Services and Protocol (CMIS/P), which specifies the format of network management messages.

The profiles for layers one to six and for the first three sub-layers at the seventh layer — up to and including CMIS/P — should be determined by the end of 1988.

OSI/NM Forum
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Messages And Services

The second group will be selecting high-priority application areas to define message content. It expects to make an early start on event and configuration reporting.

It will establish the messages and services required within a network for management purposes. It will select, as the areas of first priority, messages and services related specifically to configuring the elements of a network and their topology and to event reporting and management.

These are the messages and services that flow across the interoperable interface between products and systems supplied by different vendors.

Event information will include items such as status changes of the managed objects, additions or deletions of managed objects, collection of alarms, etc.

Currently the list of manageable objects will include voice and data switches, multiplexers, computer systems and applications, modems, terminal concentrators, local- and wide-area network equipment, transmission systems and information services.

Additional work will be undertaken to determine processes and guidelines for defining network management objects and messages. For example, it will adopt naming and addressing plans and a directory of structures. ■

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Cimtek Offers Marketing Tool For Industrial Automation

New Database Includes Information About Manufacturing Trends

Cimtek offers a database that shows how American companies are buying and using industrial automation equipment. The database allows users to zoom from an industry-wide perspective to the detail of a plant-by-plant analysis.

With the Cimtek database, researchers can "see" into a large percentage of America's major manufacturing plants. Packaged with easy-to-use software, the data can quickly pinpoint those industries where automation is developing fastest. Marketing and sales managers can learn which customers they have not penetrated, who their competitor's biggest customers are and where their competitors may be vulnerable.

At the core of the database is the National Industrial Automation Survey, sent periodically to more than 70,000 control engineers and engineering managers in plants nationwide. Cimtek's primary survey targets are manufacturing sites with more than 100 employees, where the bulk of automation activity is taking place. Because of the high rate of response (more than 24,000 individuals in over 14,000 plants) and the use of artificial intelligence to extend the data to 41,000 plants, the database gives a highly detailed picture of the state of automation in the U.S. today.

Cimtek provides usage and sales figures on industrial mini- and microcomputers, programmable controllers (PLCs), cell controllers, batch process control systems, plant floor networks and operator interfaces. Data on vision inspection systems and robots will be added in the future. The database quantifies annual automation consumption, installed base of equipment, vendor preferences, end-use spending plans and other critical automation variables.

The survey data provides an economical alternative to market testing: It allows a vendor to model a market segment and predict sales of a specific cell control product even before building it. "The database tells the vendor what applications customers are likely to use a piece of equipment for," says Bradley, "as well as what other vendor systems it will have to interface with. It also tells him about the customer's overall purchasing plans for cell controllers and other specific products, such as PLCs, computers and batch process control systems."

HP, Indigo Sign Corporate Agreement

Allows For HP Internal Distribution Of Indigo Products

Indigo Software Ltd. and Hewlett-Packard recently signed an agreement granting HP a corporate license for Indigo's electronic forms software products.

This agreement grants HP a corporate license, allowing the California-based computer manufacturer to distribute internally Indigo's IPRINT, IMERGE and IPROMPT products for use at any of its locations. These products allow users to design electronic forms on a PC and print them merged with data on the full line of HP LaserJet printers. Electronic forms can be compiled and transferred to HP 3000 and HP 9000 computers for production printing of forms merged with data. Indigo's development interface to Cognos Inc.'s PowerHouse 4GL and Indigo's data flow diagramming product ICHART also are included in the agreement.

HP, KLA Sign Agreement For KLA/Express-3000

HP Granted Corporate, Site And Per-Copy License

KLA and Associates Inc. (Clearwater, FL) and Hewlett-Packard have signed a corporate agreement for KLA/Express-3000, granting HP corporate, site and per-copy licenses for the use of KLA/Express-3000 within HP worldwide.

KLA/Express-3000 has gained popularity as a system-management tool since its introduction in 1986. With its ability to make systems "smarter," KLA/Express-3000 has dropped response times from minutes to seconds and run times from hours to minutes on HP 3000 business computer systems.

Personalized Software Establishes Portable Equipment Exchange

New Division Buys And Sells HP Portables

Personalized Software recently announced the creation of the Portable Equipment Exchange, a new division that buys and sells used Hewlett-Packard products.

"The quality of HP portable equipment is such that we are comfortable offering a one-year guarantee on all our used products," says Hal Goldstein, president of Personalized Software.

In addition to the one-year repair guarantee, there is a 30-day unconditional money-back guarantee. "We want to make sure that our customers are happy with what they buy," says Brian Teitzman, sales manager.

"Many customers trade in old equipment for new," reports Teitzman. The most common upgrade is from the HP 110 Portable to the Portable Plus. Other customers trade up to the new near-laser quality Deskjet printer or the IBM-compatible Portable Vectra, a combination desktop/portable computer.

Used portable Plus computers range in price from $995 to $3,995. Used HP 110s typically cost $750. Another advantage of buying used machines, according to Teitzman, is that they typically come bundled with software.

Shipping is free on U.S. orders over $200, and most models are in stock for immediate delivery. The Portable Equipment Exchange offers trade-ins on HP upgrades. Personalized Software and Hewlett-Packard provide complete support.

Contact The Portable Equipment Exchange, P.O. Box 869, Fairfield, IA 52556; (515) 472-6330.

HP Executive Keynotes Major Workstation Conference In L.A.

Platt Scheduled To Open EWC November 29

Lewis E. Platt, executive vice president for Hewlett-Packard's Technical Systems sector, kicks off the Engineering Workstations Conference with his keynote address Tuesday, November 29, at the LAX Hilton.

The three-day event for engineering management and professionals features a major exposition displaying the latest in workstation design and engineering applications. The technical conference offers industry speakers and panels on numerous topics including CAD/CAE, AI, CASE, technical publishing and communications.

At Hewlett-Packard, Mr Platt is responsible for the design and manufacture of workstations and software products for CAD and engineering applications. "We're happy to have Lew Platt as keynoter," said David Newman, EWC general manager. "He is a major force in the move toward industry standards. His position enables him to inform our audience on current applications and future trends in technology.

Brant Computer Services And Cognos Sign Agreement

Brant To Resell PowerHouse

Cognos Incorporated (Ottawa, Ontario) and Brant Computer Services Limited (Mississauga, Ontario) have completed a non-exclusive agreement enabling Brant Computer Services to resell PowerHouse, Cognos' application development language, in Canada and to distribute PowerHouse PC in Canada. PowerHouse PC is the recently released PC version of Cognos' advanced programming language.

Under the terms of the agreement, Brant Computer Services will sell PowerHouse as part of their general consulting offering, as well as in conjunction with Accounting/Distribution software and their own Time and Billing System, both of which are written in PowerHouse.

Brant Computer Services Limited is one of Canada's largest systems integrators within the Hewlett-Packard market. Established in 1969, Brant has grown to become a nationwide software and service firm with offices across Canada.

The company has a broad range of expertise in consulting, computer equipment services and software products primarily within the general distribution, financial services and artificial intelligence markets.

McCormack & Dodge Software Sold To Satcom

What Does It Mean?

McCormack & Dodge's recent sale of its HP accounting products to Satcom did not surprise industry watchers and M&D users — but it did make Satcom, an independent vertical-market software firm based in Virginia Beach, VA, into a significant force in the HP accounting software business almost overnight.

Talmadge Broughton, Satcom's founder and president, emphasized that the deal with M&D signals a major change in the strategic direction of his company.

Under the agreement announced in late March, Satcom acquired the rights to market M&D's HP accounting packages for general ledger, accounts payable, fixed assets and purchase orders. Satcom also has been assigned M&D's U.S. and international customers who have licensed these products in the past.

Previously, Satcom specialized in vertical markets such as manufacturing, distribution and health care, but the company now will be a major player in the general accounting horizontal market, competing with the likes of Collier-Jackson, HP, Cognos and Smith, Dennis & Gaylord. Satcom now is among the top six general accounting software vendors on the HP minicomputer.

Broughton said that Satcom now will be focusing its vertical market products in the areas of distribution and PSI (purchasing and stores inventory), adding that the agreement gives Satcom's vertical market software a "springboard into the international market" through M&D's overseas affiliates, especially in Europe. Satcom currently sells directly to customers as well as through a network of distributors across the U.S. and Canada.

The M&D deal also offers opportunities for synergy, according to Broughton. The current M&D HP product line does not include an accounts receivable module, but Satcom already has this product and will be offering it to customers and prospects. Similarly, Satcom has not had a fixed assets package for its customers and now will be able to offer the one developed by M&D. Broughton noted, however, that there are no plans to merge the Satcom and M&D product lines.

Broughton emphasized that Satcom intends to build on the company's commitment and performance in order to develop a strong user base. Current M&D users also will be happy to hear that Satcom plans to invest in enhancing these products, in order to offer and support what the company calls "world class financial systems." — *Contributed by Robert Shelley, Highgate Financial Systems.*

Keithley Joins VXIbus Consortium

Joins HP And Others

Keithley Instruments has increased its involvement in VXIbus development by joining the VXIbus Consortium.

The VXIbus Consortium is a group of test and measurement companies that is working to develop and maintain an open system that allows function modules from different manufacturers to operate in one standardized chassis. VXI stands for VMEbus Extensions for Instrumentation. The group originally was formed by Colorado Data Systems, Hewlett-Packard, Racal Dana Instruments, Tektronix and Wavetek.

VXIbus is based on the Instrument-on-a-Card design concept. A test engineer will be able to use various instruments, or cards, from different companies in one instrument system, without experiencing barriers to compatibility or data transfers among the cards that are present with today's products based on different standards.

HP Office Programs Available On 3000s Running HP-PA

Office-Service Software No Longer Tied To Traditional Architecture

Hewlett-Packard recently announced that its leading office-services packages now are available on its HP 3000 Series 900 Precision Architecture (HP-PA) business computers.

The packages currently that run under the MPE/XL operating system on HP-PA computers include HP DeskManager, an electronic-messaging system; HP Convert/DCA, a document-conversion program; and TDP and HP Word Intrinsics, document-processing programs.

In addition, PC users of HP AdvanceMail II, a PC-based electronic-messaging program, and HP AdvancePrint, a shared printing and plotting program, now can communicate with HP-PA computers.

Previously, these programs were available only on HP 3000 computers based on HP's traditional architecture.

The following HP office-services software programs are available now from sales representatives and HP authorized dealers: HP DeskManager electronic-mail system, HP File/Library community-filing system, HP Slate, HP Schedule, HP Convert/DCA, HP TDP/3000 text and document processor, HP Word Intrinsics, HP Spell American Dictionary and HP ListKeeper personal information-management package.

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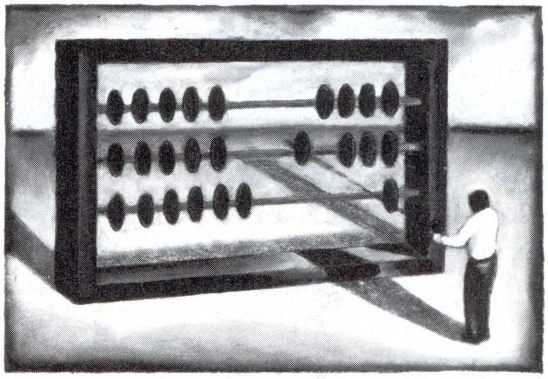

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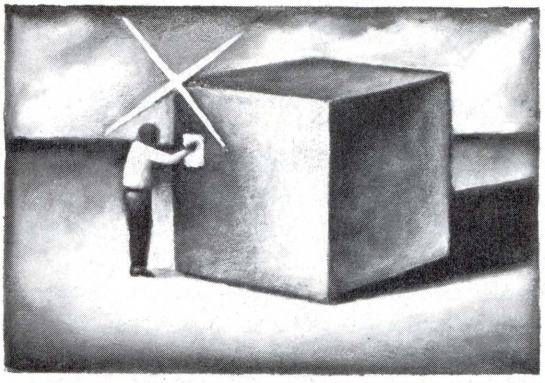

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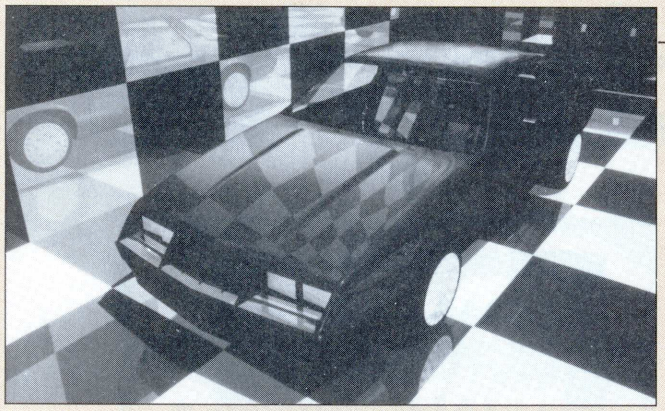

Ray tracing allows you to produce realistic highlights and reflections. Data to produce this image courtesy of Chrysler Corporation.

HP Announces Photorealism Breakthrough

Progressive Refinement Generates More Realistic Graphic Images

HP recently introduced what it calls "a dramatic advancement in photo-realistic image rendering" — progressive refinement for fast radiosity image generation. Progressive refinement is an extension to radiosity, a global-illumination algorithm that generates images with highly realistic lighting, shading and shadowing effects.

Radiosity also provides the user with the capability to view rendered objects from multiple views. Since radiosity is view-independent, a user can "walk" through an aircraft cabin, for example, observe different parts of the cabin and look at any part from any direction or vantage point, without recalculation.

With progressive refinement, radiosity calculations are done in seconds rather than hours. A user can view a realistic 3-D graphical image while the radiosity algorithm automatically adds more rendering effects, like shadows and color bleeding.

"HP has developed the ability to apply global-illumination algorithms to image rendering, which can be applied an order of magnitude faster than ever before possible," said Bill Kay, HP's general manager, Technical Computer Group.

Kay said that radiosity with progressive refinement will be offered on HP 9000 Series 300 and Series 800 TurboSRX workstations. Pricing and availability will be announced later this year.

In addition to radiosity, HP will be including ray-tracing capability in the Starbase Graphics Library. Ray tracing, a global-illumination algorithm, illuminates a scene by tracing rays of light from the human eye into the environment. Although the ray-traced scene can be rendered from only one viewpoint, ray tracing offers specular reflections that have been well accepted in industrial design and animation.

Third-Party Announcements Increase Graphics Offerings

Wavefront, Folsom Research, Sterling Team With HP

HP signed a marketing agreement with Wavefront Technologies (Santa Barbara, CA) to provide Wavefront's graphic-imaging software on HP workstations. The software allows users to create photorealistic imagery and models and to use external data sources to create 3-D graphics. This brings animation technology to computer engineering for design, computer-aided manufacturing, scientific visualization and other applications.

Also announced was a board-level video scan converter ($4,995), developed by Folsom Research, that lets users transfer images from their HP 9000 Series 300 workstations to video format.

Also made was an announcement that Sterling Software (Santa Clara, CA) has created a new graphics animation system (GAS) for use on the HP animation superworkstation. The advanced package, designed originally for use at the NASA/Ames Research Center (Mountain View, CA) allows users to view interactively within the 3-D space. It also can generate an animation sequence with smooth 3-D transitions between a series of specified positions.

CSPI Expands Its Mini-Map Series Of Array Processors

Mini-Map HXL Is Available Exclusively For HP 9000s

CSPI, a leading manufacturer of array processors, announces the availability of its new Mini-MAP HXL, an array processor for use exclusively with Hewlett-Packard's 9000-Series computers. The Mini-MAP HXL is CSPI's latest expansion of its Mini-MAP series.

The Mini-MAP HXL offers 38 to 280 MFLOPS of compute power and is particularly well suited to the requirements of Hewlett-Packard's 9000-Series Model-350 graphics workstation. It offers a speed increase by a factor of more than 20, of those algorithms required for image processing work, such as 2-D FFTs and other vector and matrix calculations. The Mini-MAP HXL is available to HP customers from CSPI under the HP PLUS Cooperative Marketing Program.

A new, fully illustrated, 6-page brochure describing Mini-MAP HXL, presenting applications, hardware and software features and complete specifications, is offered free upon request.

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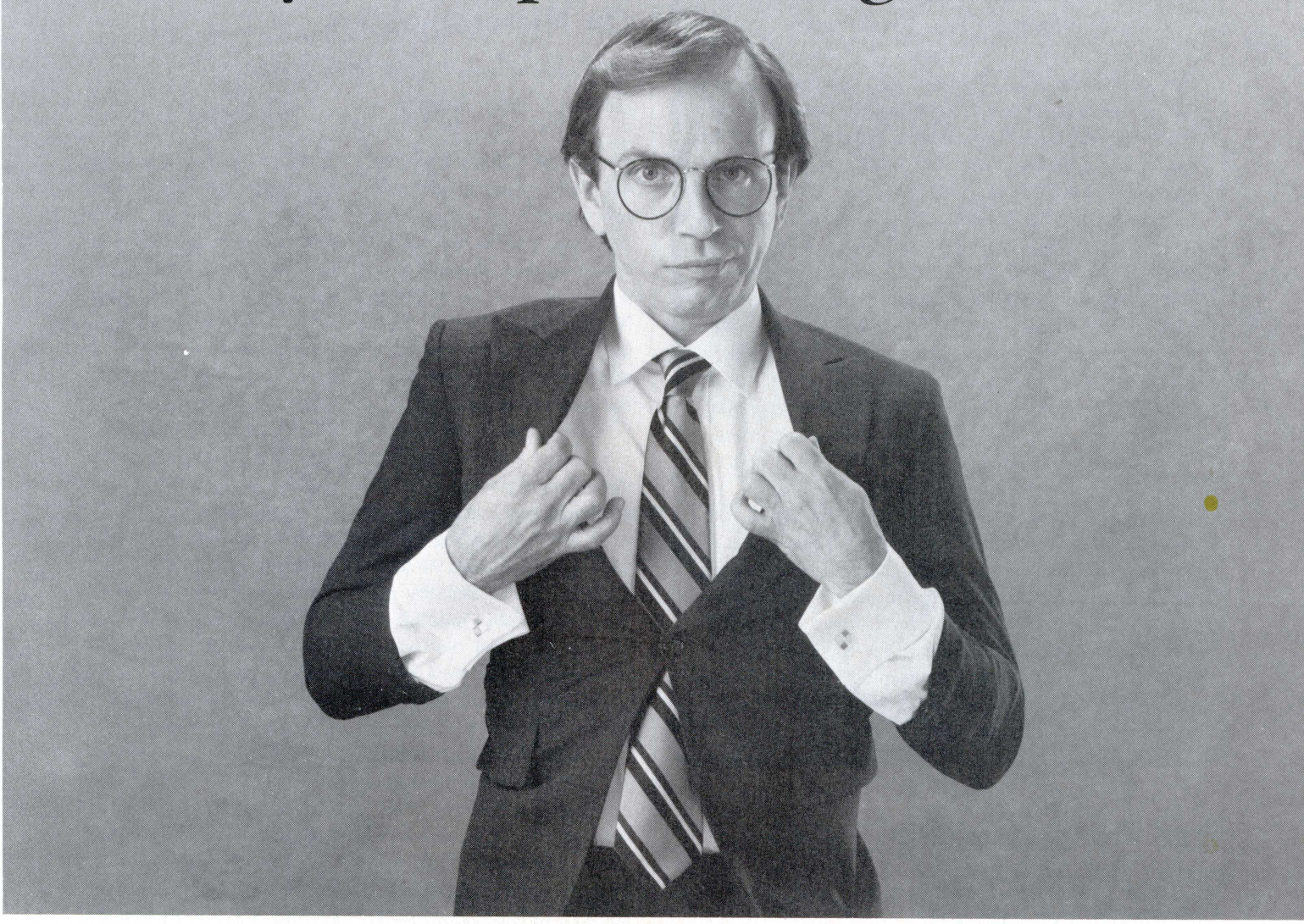

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CIA Uncovers American Distributor

TRES ASSOCIATES Named Exclusive U.S. Distributor

TRES ASSOCIATES (Austin, TX), an international Software Marketing Company, and FACER INFORMATION DESIGN (Epping, Australia) have signed a joint marketing agreement whereby TRES ASSOCIATES will be the exclusive U.S. distributor for FACER's Performance Analysis System, CIA.

CIA, an acronym for "CPU and I/O Analyzer," analyzes the heart of the HP 3000 — its CPU, memory and I/O activity. It does this both interactively and in batch mode. Its interactive module, called CIA, allows you to see what is happening on your system as it happens. The batch mode modules, called CIAMEAS, collect and report statistics for specified periods of time, allowing for trend analysis and postproduction evaluation work. CIAMEAS also automatically will control caching.

CIA will help you determine inadequacies in your disc, memory or CPU capacity. CIA will allow you to get a more intimate view of what MPE is doing behind the scenes and has been designed to allow you to operate it at a level that matches your level of experience. CIA will help you choose the optimal size of code segments. CIAMEAS allows you to take sweeping views of system usage or to focus on particular times of the day, specific discs or individual processes for detailed analysis.

Free Product Catalog

Offers Software Products Specifically For HP 150

Personalized Software has published a new catalog of products exclusively for users of the HP 150 Touchscreen and Touchscreen II computers.

"The HP 150 is far from obsolete," says Hal Goldstein, president of Personalized Software. "We have collected — and where necessary have customized — dozens of software products specifically for the HP 150."

The catalog is called "New Life for Your HP 150." It includes WordPerfect, The Norton Utilities, Condor 3 (a relational database program), Turbo Pascal 4.0, Lotus 1-2-3 enhancers, file transfer hardware and software and more — all customized to the HP 150. All products come with a 60-day money-back guarantee.

For a free copy of the HP 150 users catalog or for further information, call or write Personalized Software, P.O. Box 869, Fairfield, IA 52556; (515) 472-6330.

ADC Software Now On Microcomputers

Aide-De-Camp Available Under Santa Cruz Xenix

Software Maintenance and Development Systems Inc., recently announced the availability of the Aide-De-Camp software management system under Santa Cruz Xenix. This is the first full-featured software management system to be ported to the personal-computer level.

The product has been available on software development platforms at the minicomputer and workstation level, including Sun, DEC, Gould, Prime, HP and UNISYS. The availability of the 386-based machines brings practical software development to a new level of machine, according to president Richard Harter.

Santa Cruz operation has been very supportive, according to Harter. They recognize the importance of CASE tools and also are witnessing the movement of software development efforts to smaller, less expensive machines.

The ADC system provides change control, version control, configuration management and information in a powerful relational database. It enables software developers to perform complex operations such as builds, backups and structural documentation automatically. The ADC system provides a software audit trail. All changes to software under ADC management are explicitly recorded and documented.

The ADC system decreases administrative detail handling required of software development personnel and increases development productivity. Relationships between software entities are tracked at each release with the ADC system, something unavailable with any other configuration management system.

Software structure and relationship information is maintained in the ADC database. Changes are stored as separate, program-related entities, which can be included or deleted from subsequent versions of the software. This permits easy maintenance of parallel versions and migration of bug fixes and enhancements from one program path to another.

The price of the ADC system for Santa Cruz systems is $2,500. Pricing for the software on workstation and minicomputer platforms ranges from $5,800 to $15,200, depending upon the model and configuration. Discounts are available for quantity licenses, as are site and corporate licenses. Discounts also are available to educational institutions.

Contact Mary Cole or Richard Harter at Software Maintenance and Development Systems Inc., P.O. Box 555, Concord, MA 01742; (508) 369-7398. ■

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NP

NEW PRODUCTS

Supermap Combines CD ROM With Graphics

Space-Time Research, an Australian-based high-tech firm, recently has introduced Supermap U.S.A., a CD ROM (compact-disc read-only memory) and floppy disc software package that allows users of IBM personal computers and 100 percent compatibles to retrieve, analyze and map 1980 U.S. census data to their own specifications.

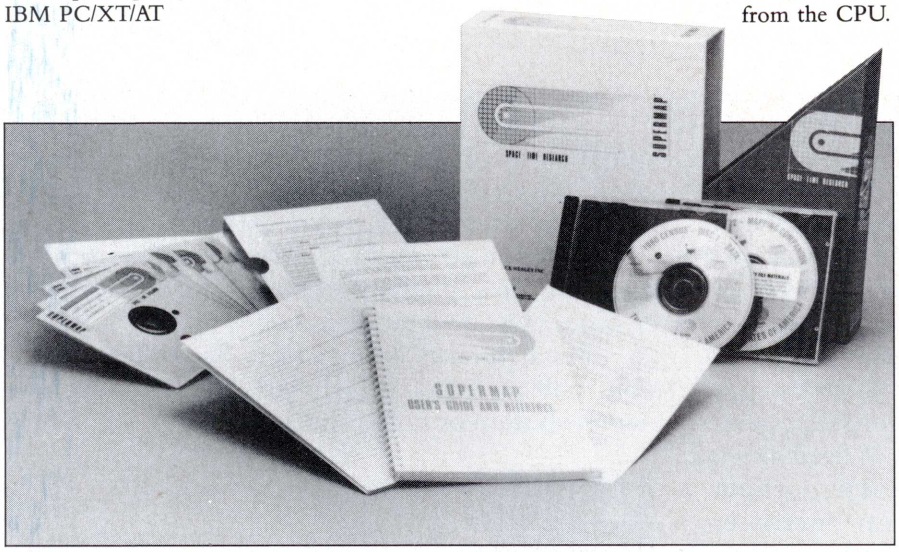
The Supermap Package ($2,730) includes one CD ROM containing census data, one CD ROM Mapping Companion with mapping boundaries, five floppy discs and a user's manual. The software, also available in regional editions, allows PC users to retrieve detailed census data quickly and generate tables and color or monochrome maps.

Data from other software, such as spreadsheets, can be imported to Supermap and mapped in the same fashion. In addition, census data tables can be exported to spreadsheets. Supermap also can export ASCII files to word processors to incorporate data into documents.

Supermap requires an IBM PC/XT/AT or 100 percent compatible computer with 512K RAM, hard disc and CD ROM drive, an IBM or compatible enhanced graphics adaptor and matching enhanced color display. A color ink jet printer is needed to print color maps, although monochrome mapping capability is available with most printers.

Contact Chadwyck-Healey Inc., 1101 King St., Alexandria, VA 22314; (703) 683-4890.

Circle 400 on reader card



Supermap CD ROM/floppy package allows PCs to analyze 1980 U.S. census data.

Spoolbox Now Works On Spectrum Machines

CPL Systems' Spoolbox HP 3000 printer interface now is working on the new Spectrum Series of HP 3000s.

Spoolbox allows you to connect any serial printer to the HP 3000 in unattended spooled mode just like an HP remote spooled printer.

The advantage of the spooled RS-232 interface is that it is simple and does not require any modification to standard I/O software or any special HP 3000 interface changes. Also, it means you can locate the printer at long distances from the CPU.

Contact CPL Systems, Old Well House, 15 Oldwell Close, Sheffield S17 4AW United Kingdom; (0742) 352612.

Circle 398 on reader card

SQL+ DBMS Available For PC/ATs And Compatibles

Advanced MicroSolutions has announced a version of SQL+, the real-time relational database management system, for the PC/AT and compatibles running the HP BASIC Coprocessor. SQL+ now is supported on the HP 9000 Series 200/300 workstations and PCs.

SQL+ boasts significant performance advantages over any other data management system including the BASIC language commands.

SQL+, a true fourth-generation language (4GL), reduces software development time and provides the versatility and power to expand and enhance any application.

SQL+ ($995) is available today. Modules also are available for SQC, SPC and Data Acquisition and Control.

Contact Advanced MicroSolutions, 2510 Middlefield Road, Redwood City, CA 94063; (415) 365-9880.

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TurboExpert Handles Capacity Management

TurboExpert is an Image/TurboImage capacity management system designed around an expert system program shell. TurboExpert determines the most efficient capacity size needed to maximize both throughput and free space. TurboExpert works in interactive mode, allowing database capacity checking during the day, as well as in batch mode, for a daily analysis and maintenance of all your production databases.

It works by looking at the dataset's entry count as a moving picture of activity rather than a static snapshot. You assign desired free space in days rather than a percentage or range of free space entries. No set-by-set maintenance is needed because

TurboExpert uses artificial intelligence to learn what really is happening to your data.

After TurboExpert determines a new capacity, it generates a stream job that uses one of several of the most popular on-line capacity change programs to finish the job for you. TurboExpert sells for $900 with a $50 annual maintenance fee.

Contact EXPERT SYSTEM PROGRAMMING, 800 Falls Ave, Suite 2A, Twin Falls, ID 83303; (208) 734-0845.

Circle 396 on reader card

HP Expands Graphics Family Of Computers

Hewlett-Packard recently announced what it believes is the first general-purpose superworkstation that can animate still images for applications requiring the user to see motion.

HP said the HP 9000 Model 835 animation superworkstation broadens its workstation-graphics product line and is the lowest-priced animation superworkstation ($67,600) on the market.

Introduction of the animation workstation and two related products — Wavefront Technologies' graphics-imaging software and a board set from Folsom Research Inc. that lets workstation users transfer images to videotape — marks HP's entry in the growing animation market.

Introduced at SIGGRAPH '88, HP's new superworkstation expands the company's graphics offerings to include new markets, such as commercial animation and scientific applications that need to simulate motion.

These applications include weather forecasting, medical imaging, fluid-flow analysis and molecular modeling. The new animation superworkstation also extends HP's capabilities in computer-aided mechanical design applications where users must determine how motion will affect product designs before products are built or modeled.

The animation superworkstation is based on HP Precision Architecture, HP's implementation of reduced instruction-set computing (RISC). The new computer combines an HP 9000 Series 800 TurboSRX workstation with a high-speed animation interface that tranfers data from main memory to the TurboSRX at speeds up to 13 MB per second.

This transfer rate enables the workstation to play back animated images so users can simulate motion in real-time applications. Contact the Hewlett-Packard sales office listed in the white pages of your telephone directory.

HP's new animation superworkstation and software from 3-D Biomedical Imaging allow medical professionals to explore images of the human brain.

Circle 399 on reader card

First VXIbus Products Available From HP

Hewlett-Packard recently introduced a VXIbus mainframe and a set of VXIbus development tools for early adopters of VXIbus (VMEbus extentions for instrumentation) who are developing their own custom instruments on a card.

These tools give the VMEbus user the ability to develop VXIbus products faster and with reduced resources.

The VXIbus, an open instrument standard that has gained rapid industry acceptance since its introduction in 1987, is based on the IEEE-1014 (VMEbus) standard.

VXIbus enhancements of VME provide a powerful environment for instrument-on-a-card development and use.

Because VXIbus is an open-standard instrumentation system, test developers can build their own modules. VXIbus manufacturers also can use these tools to speed product development and minimize time to market.

HP's VXIbus development tools are designed for product development of C-size and smaller VXIbus modules. C-size carriers allow development of A- and B-size modules within the C-size mainframe.

HP's tools help users develop their circuitry on HP's register-based breadboards and communicate with their modules via an HP 9000 Series 300 controller and VMEbus interface. Special VXIbus software smooths this communication path further. The software runs in HP BASIC.

Contact the Hewlett-Packard sales office listed in the white pages of your telephone directory.

Circle 395 on reader card

BASIC/UX Combines UNIX Power With BASIC Ease

Hewlett-Packard recently announced that HP BASIC, the BASIC language optimized for instrument control, now is available for use on HP-UX. HP-UX is Hewlett-Packard's implementation of the industry standard System V UNIX operating system.

The HP BASIC/UX environment retains the friendly, high-performance instrument control capabilities of HP BASIC (sometimes known as "Rocky Mountain BASIC" or "RMB"). The language and development environment are the same as that used by Series 200/300 HP BASIC

customers. The marriage of HP BASIC and HP-UX provides new features such as networking, multitasking and windowing, which can be put to work on test applications.

HP BASIC/UX extends the capabilities of HP BASIC by taking advantage of the advanced facilities of HP-UX. Key enhancements afforded by HP BASIC on HP-UX include industry-standard networking, multitasking, windowing, complied subprograms and full HP-UX access.

HP also introduced the Model 360MMAX ($17,820) and Model 360CMAX ($22,050), two new systems configured specifically for instrument control with HP BASIC/UX. Based on the HP 9000 Model 360, HP's recently announced 25MHz MC68030 computer rated at 4.5 MIPS, these two products represent the highest performance instrument controller systems in the Series 300 line.

HP BASIC-UX runs on all HP 9000 Series 300 computers. A license to use HP BASIC/UX is $995. Media and documentation is $305.

Contact the Hewlett-Packard sales office listed in the white pages of your telephone directory.

Circle 394 on reader card

LaserRX Monitors System Performance

Hewlett-Packard recently announced HP LaserRX the industry's first performance-management tool that operates on a CD ROM-based (compact-disc read-only memory) personal-computer workstation.

Designed to moniter HP 3000 business computers, HP LaserRX software runs on HP Vectra or IBM AT personal computers incorporating a 5¼-inch CD ROM drive and user interface based on MS Windows.

HP LaserRX software enables HP 3000 users continually to monitor and evaluate information critical to maintaining peak computer-system performance. The information includes CPU performance, memory and disc utilization, response time and transaction throughput.

Using HP LaserRX software, the user can conduct varied performance-management activities, such as identifying and isolating performance bottlenecks, evaluating corrective actions and balancing systems components for maximum efficiency.

HP LaserRX allows single or multiple HP 3000 systems to be analyzed from a single PC workstation through a RS-232-C data-communication link or a local area network.

When users are ready to evaluate the information, they select from a menu, and the specified information automatically is transferred from the host system to the PC. Unlike traditional performance-management tools, HP LaserRX software does not require the user to access directly all pertinent information.

Users also can export the information to other software packages, such as Lotus 1-2-3, for analysis purposes.

All LaserRX software components will be delivered on a 4.72-inch disc that will fit a 5¼-inch CD ROM drive. CD ROM is an extension of the technology found in audio compact discs. The same platter on which the music industry places 70 minutes of digital sound also can store up to 600 MB of electronic information.

HP LaserRX, including the performance-management software components on CD ROM, is priced according to the number of systems being monitored. Prices range from $8,650 to $24,850.

Contact the Hewlett-Packard sales office listed in the white pages of your telephone directory.

Circle 384 on reader card

Unison Announces New MAESTRO Release

Unison Software recently announced a major new release of MAESTRO, the batch job scheduling system for the HP 3000, including 900 Series Spectrum computers.

MAESTRO automates manual tasks associated with batch job management, such as integrating user job requests, scheduling production, preparing job streams and documenting job status. MAESTRO also automates operator activities such as launching and tracking jobs, enforcing dependencies and restrictions and managing recovery procedures.

"Several security and performance enhancements have been addressed in the new version, B.04. Additionally, all known problems in MAESTRO have been fixed," said Michael Casteel, executive vice president of Unison.

New features include the ability for MAESTRO to control all batch jobs, including those streamed by users and by application programs. MAESTRO creates multiple, independent job queues that make it possible to limit the number of jobs running concurrently for each account or application.

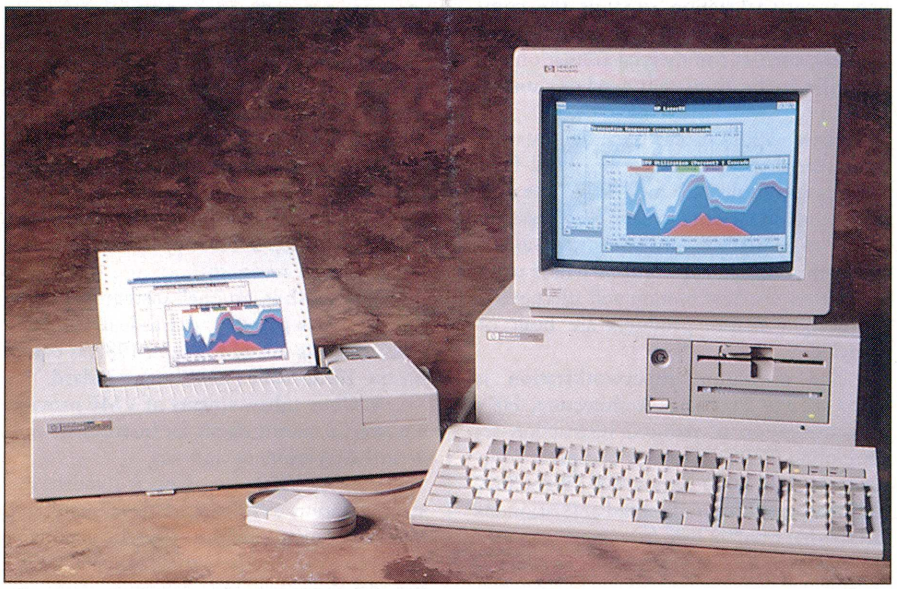
By utilizing Remote File Access (RFA) automatic logon, a recent feature in HP's NS (Network Services) software, MAESTRO improves network security by preventing unauthorized access to remote systems. Other improvements to MAESTRO's networking capabilities reduce network overhead and increase performance.

MAESTRO is value-priced according to CPU size.

Contact Unison Software, 415 Clyde Ave., Mountain View, CA 94043; (415) 968-7511.

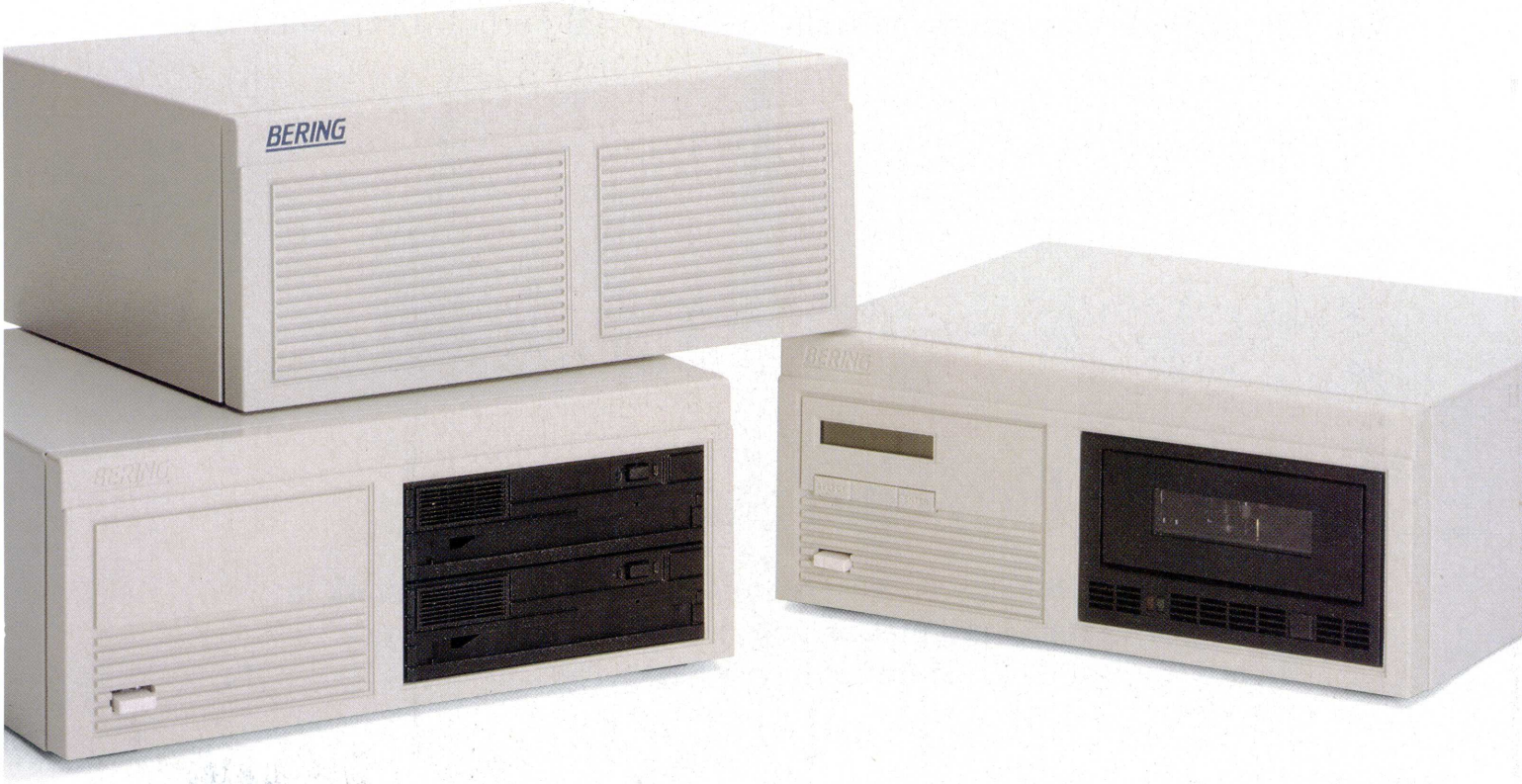
Circle 387 on reader card

Continued on page 82.



LaserRX operates on a CD ROM-based PC to monitor, evaluate and maintain peak performance on the HP 3000.

Bering's solution series.



Bering introduces three new members to its family of Hewlett-Packard subsystems. Each of these products is specifically tailored to meet today's demanding storage needs.

The new EconoPac 5050, delivers 500MB of storage capacity, an ideal solution for local area networking, or any other large capacity requirement.

The TwinPac II offers removable storage for security, expandibility, exchangability, backup and archiving.

The all new 5¼ inch format means even more convenience and continued reliability.

And Bering's new 2000MB Tape backup subsystem can handle any back-up need. State-of-the-art helical scan technology ensures efficient, error free backup.*

Bering's products are 100% hardware and software compatible with HP computers using CS/80 and SS/80 command sets, including, HP9000 Series 200/300/500, HP1000, and HP3000 computers.

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*Product available for shipment 1/89

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What did the BARUG database benchmark measure?

The ability to change, dramatically, a non-trivial TurboIMAGE database.

How did Adager do?

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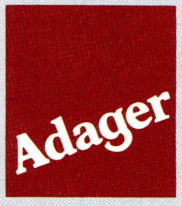

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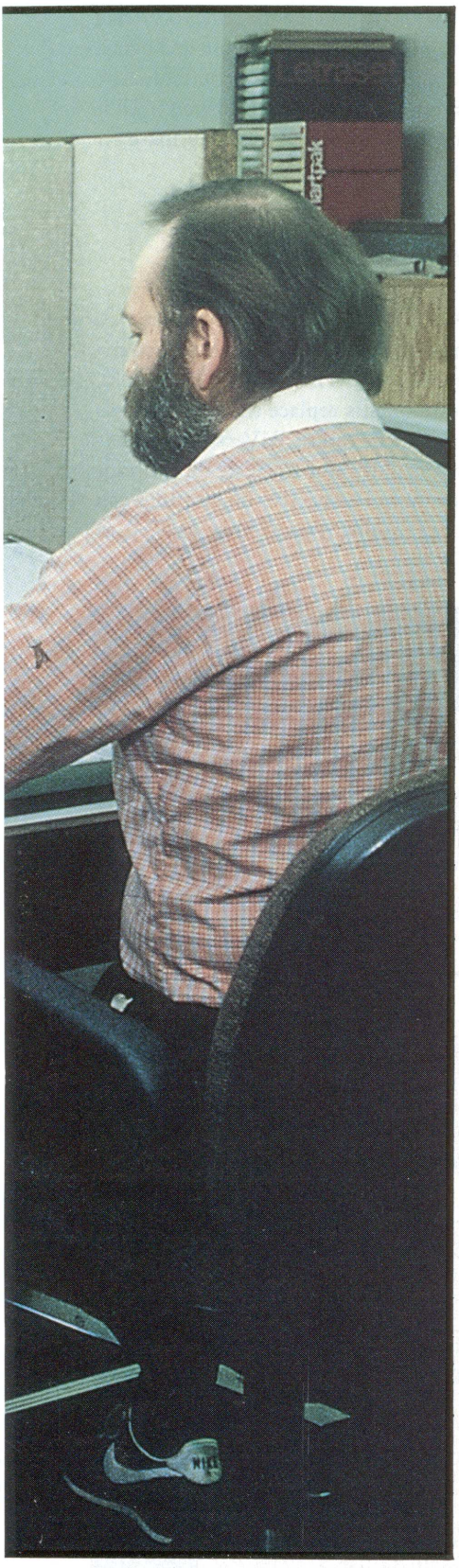
Chuck Good, O'Neil and Associate's assistant art director, uses the TriVector 3D Illustrator.



An Introduction To The TriVector 3D Computer-Aided Illustration System

Creating Technical Illustrations

[By Jan Hackett]

The demand for illustrations in technical documentation is intensifying. For example, the assemblage of technical documents for a single Oshkosh Army truck stands six-feet high, with illustrations appearing on almost every page.

As the subject matter becomes more complex, technical manuals are becoming increasingly laborious to produce. As the products being described become more intricate and elaborate, the requirements for illustrations to support text increase. And, while most documents contain less art than text, creating the art consumes up to 80 percent of the labor involved in technical document production.

Even though the demand for illustrations grows daily, many publishers of technical manuals continue to invest in more efficient text-producing systems while illustration still is done manually. Generating finished art on time for publications was never a simple task, but now illustrators must try to meet even shorter deadlines. Managers are finding that, although they have pages of text, illustrations often are unavailable. To solve this problem, O'Neil & Associates, a technical publication company specializing in the preparation of technical documentation for the military and commercial equipment manufacturers, moved to the TriVector 3D computer-aided illustration (CAI) system.

A manually prepared perspective line drawing illustrating parts of an Army truck might be executed as follows: First, the illustrator reads the dimensions from two

views on a blueprint and plots them in pencil as accurately as possible on a sheet of vellum taped onto a predetermined perspective grid. Different colored pencils are used to indicate various components and to separate temporary "guide" lines from "hard" lines, those that appear in the final illustration. Each component and each view is plotted separately.

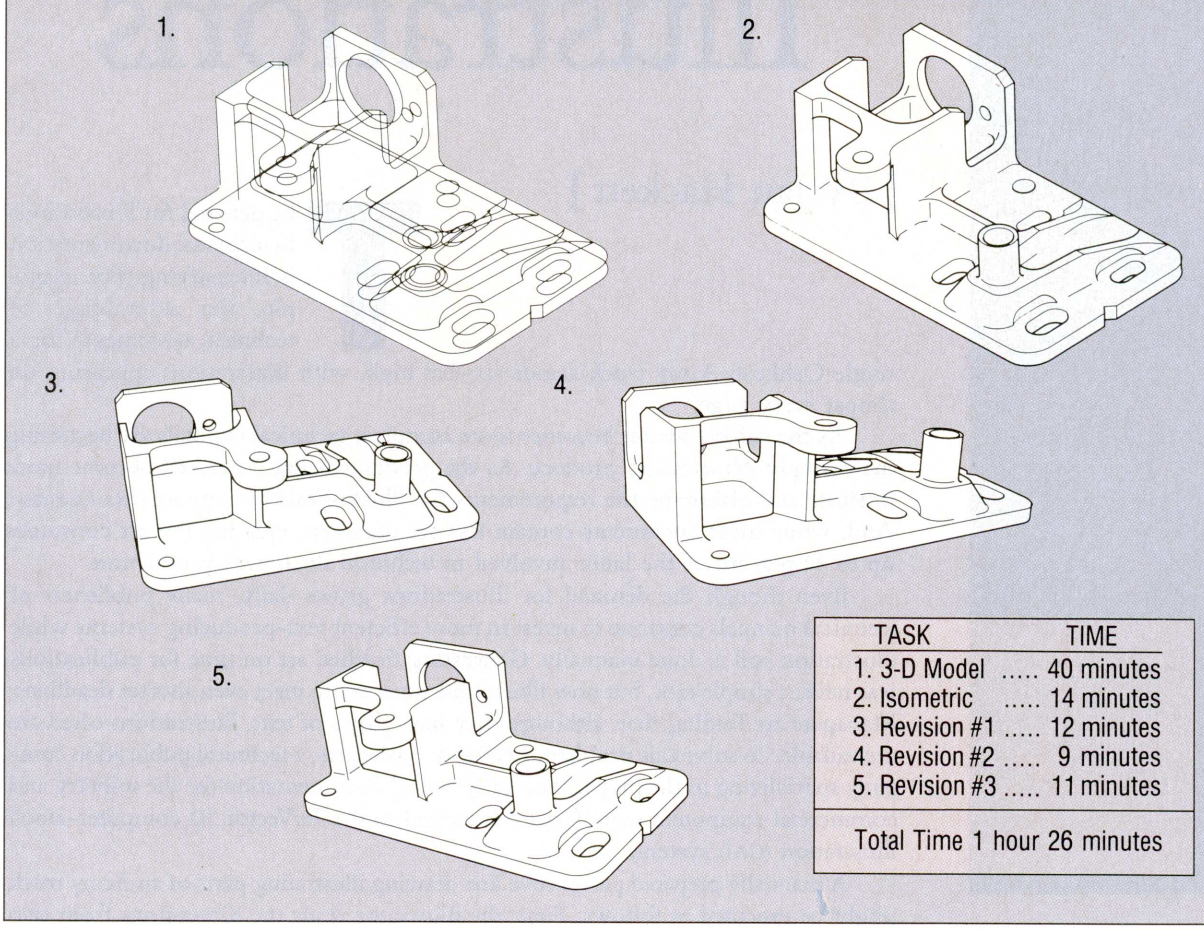
Mylar is laid over the vellum, and the hard lines that make up the finished illustration are retraced. Each component is traced in its proper position and orientation in the assembly. Various components, component assemblies and views are created separately. Changes are made by covering the areas requiring alteration and repeating the above process. This manual process of tracing is tedious and inflexible. Consequently, it severely limits the number and variety of illustrations that can be produced.

Because perspective illustrations are difficult to draw, many illustration departments forego the use of perspectives and use isometric illustrations instead. However, little time is saved because the illustrator still must take the time to extract information from prints, plot the points onto vellum and pencil in the connecting lines. Furthermore, whether an isometric or perspective illustration is created, it is not finished until it is inked. The illustrator must go back and carefully ink over penciled lines, also a time-consuming process.

Using A CAI System

WITH THE TRIVECTOR SYSTEM, however, all illustrations are created on a computer screen instead of a drawing table. The system's hand-held, dual-cursor data-entry components replace the pens, pencils and other traditional illustration tools. TriVector's model-positioning controls allow the illustrator to create illustrations from any angle, distance or view. Perspective illustrations can be created from any vantage point. Perspective, as well as

FIGURE 1



TASK	TIME
1. 3-D Model	40 minutes
2. Isometric	14 minutes
3. Revision #1	12 minutes
4. Revision #2	9 minutes
5. Revision #3	11 minutes
Total Time	1 hour 26 minutes

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Simple and detailed reports are easy to create. The unique painting facility allows users to draw the report layout directly on the screen. VISIMAGE PC provides all the functions of a powerful report writer, simply designed for the end user.

PC/HP3000 Access

VISIMAGE PC includes a new communication package designed by Walker Richer and Quinn that allows you to access HP3000 data using any PC network. Users have access to IMAGE databases, KSAM, MPE and SD files. VISIMAGE comes complete with interfaces to OMNIDEX, DICTIONARY/3000 and POWERHOUSE dictionary. Sophisticated features allow the DP department to retain total control over security, confidentiality and system resource usage.

On-line Tutorial

VISIMAGE PC's ease of use is enhanced by a tutorial mode for novice users. Pop-up windows guide the users through each step. Very quickly you will become an expert at reporting and downloading data.

Downloading

Your HP3000 data can be automatically downloaded to the PC. All the major PC formats are supported, making your data available to spreadsheets, word processing and other productivity tools (e.g. LOTUS 1-2-3, DBASE III, etc.).

Windows

VISIMAGE PC combines the power of VISIMAGE with the flexibility of a window environment. Pull-down menus and pop-up windows give the user easy access to timely information. Use the mouse to design the layout of your report or "click" the items you want to select. VISIMAGE PC runs on all IBM compatibles, using MS-DOS or OS/2, with a basic configuration.

VISIMAGE PC puts all the pieces together giving users a complete solution. Call today for a demo diskette to learn how VISIMAGE PC can benefit you and your company.

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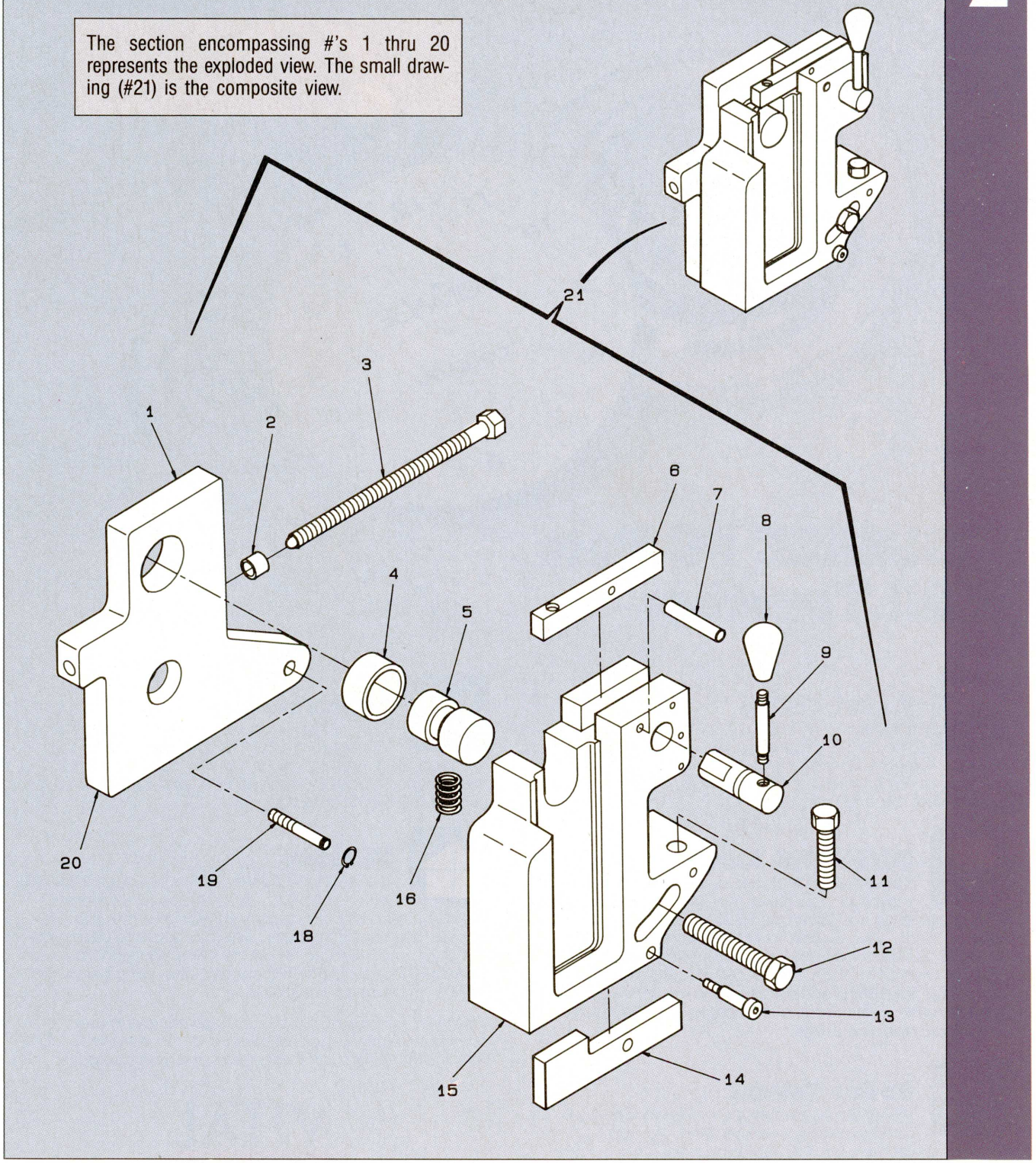
FIGURE 2



The TriVector 3D Illustrator is capable of producing both composite and exploded views of technical illustrations.

isometric, dimetric and trimetric illustrations can be produced in a fraction of the time needed with traditional methods.

The illustrator utilizes the CAI system's three-dimensional database to create a 3-D wireframe model of the object to be illustrated. Three-dimensional wireframe models are created onscreen from two-dimensional blueprints. To input information from a blueprint, the illustrator uses one cursor to identify the plane or surface he wishes to enter. Once selected, the second cursor is used to input the surface, which appears on the screen as the corresponding surface of the three-dimensional model. The illustrator completes the wireframe model by entering the rest of the information in the same manner.

Once the three-dimensional wireframe model has been created, any number of views can be produced. Productivity is improved substantially when single illustrations are needed, and when multiple views are required, the amount of time saved is extraordinary.

For example, the 3-D wireframe model shown in *Figure 1* was created in just 40 minutes. The artist then created the other four illustrations from the 3-D model. The second illustration, an isometric, was completed in 14 minutes using the wireframe model as a starting point. The other three illustrations, all perspective drawings, also were generated from the same 3-D model. They were created in 12, 9 and 11 minutes, respectively. All four illustrations were produced in just 46 minutes. Add to that the 40 minutes to create the wireframe model and the total time was 1 hour and 26 minutes, a substantial savings when compared to the 8 to 12 hours needed to produce the same four illustrations on a drawing board.

There are approximately 130,000 tech orders annually for the United States Air Force alone. This translates into about 20 million pages of text and graphics. Approximately two million pages of those tech orders change each year, making file accessibility an important requirement. TriVector's 3D CAI system is especially helpful in making changes to existing illustrations.

Once stored on disc, changes can be made quickly to an illustration simply by revising it. Traditionally, any change to an illustration meant that it had to be redrawn completely. With the TriVector system, changes can be made to existing drawings over and over again, and each revised illustration has the quality of an original when it is output.

Storing illustrations on magnetic tape rather than the traditional film negatives or positives has advantages. Using the manual system, determining the changes and then finding the original illustrations were more time consuming than making the changes themselves. But, when illustrations are digitized, retrieval is much easier and faster.

Once retrieved, an illustration can be enlarged, reduced or viewed from any angle, while the original rendering remains stored. Whether it is parts from a hardware symbol library or more complex truck engine parts, such as pistons, cams or connecting rods stored as symbols, the time saved is substantial.

"In the area of perspective illustrations, the TriVector system is truly remarkable," says O'Neil's assistant art director, Chuck Good. "With the CAI system, creating a perspective drawing is no different than creating any other drawing." For example, in order to draw a building in perspective, the illustrator begins by drawing one window on the computer screen. The repeat capabilities of the system then are employed to draw multiples of the window, letting the computer put the windows in a receding order, in perspective. The final rendering of the building is actually a number of smaller illustrations, quickly assembled on the computer screen.

The illustrations in *Figure 2* are an example of how the system can accommodate a variety of work, from complicated

TriVector 3D Illustrator, Tiger
TriVector
5411 Avenida Encinas
Carlsbad, CA 92008
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exploded views to composite views. The composite and exploded views were created from the same 3-D wireframe model in a fraction of the time needed to produce the illustrations using any other method. According to Good, "O'Neil uses the TriVector system for virtually any type of art: electrical schematics, flow charts, graphs and performance curves are drawn on the CAI system."

The system also is helpful in converting a photograph to line art. Using it as source material in the way you would use a blueprint, the photograph is quickly traced using the dual-cursor data-entry components. Generally, photographs are cheaper to produce than line art, but because they are difficult to reproduce, the use of photographs is prohibited in most new technical manuals.

TriVector's Compatibility

O'NEIL & ASSOCIATES IS USING the Hewlett-Packard version of the TriVector software. The software is running on the HP 9000 workstation with 4 MB RAM, a 20-MB hard disc, a 710K double-sided 3.5-inch floppy and a floating point processor. The completed illustrations are output on the HP 7580 pen plotter. In addition, illustrations stored on the TriVector system can be transmitted to other devices that support one or more of the following formats: 3-D and 2-D IGES, CalComp 925/960, Compugraphic CAPS, HP-GL, Interleaf, Kodak KEEPS, Omnipage, PostScript and encapsulated PostScript and Xyvision. IGES files can be translated using TIGER, a graphic translation utility developed by TriVector. TIGER is a bidirectional graphic-format translator that can read IGES and other graphic formats and translate them. For example, 3-D or 2-D IGES files can be translated into PostScript or encapsulated PostScript, or can be input directly to the TriVector 3D Illustrator.

As technology advances, supporting technical literature becomes more dependent on graphics. This, coupled with the fact that technical publishers are automating the text composition and pagination process, is putting illustrators under more and more pressure to generate artwork faster.

Moving to computer-aided illustration is one way that technical illustrators can meet this challenge. — *Jan Hackett is a San Diego-based marketing communications consultant specializing in high technology.*

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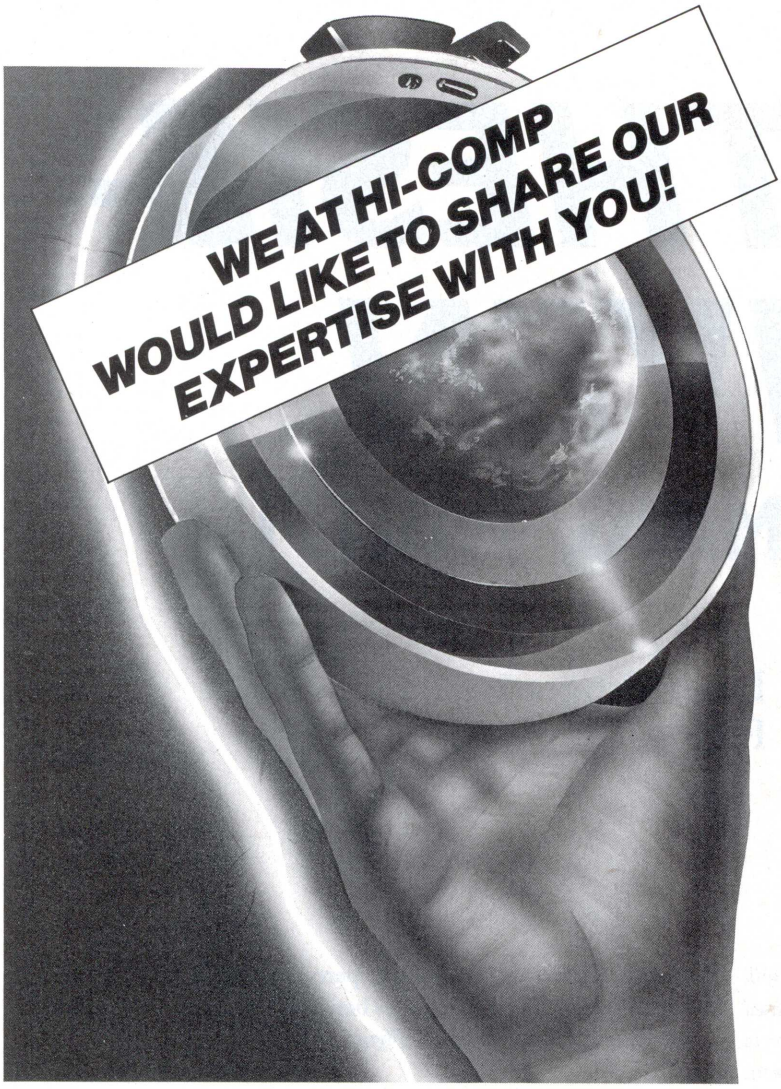

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Unattended Operation			yes
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Regular Distribution of Enhancements			yes
Private Volume Support			yes
LAN/DS Network Support			yes
Considerable Customerbase			yes
Substantial Time and Tape Savings			yes
Append to End of previous Backup Set			yes
Multiple Tape and Disc to Disc Backup			yes
User Selectable Compression			yes
Automated Functions			yes
Restore on any HP3000 System			yes
Wild Card, File and Date Selection			yes
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CIRCLE 135 ON READER CARD

HYPOTHESIS-DRIVEN PROGRAMMING, PART I

Implementing Logic Programming Using The Prolog Language

Editor's Note: In Part 1 of this article, Ross Hopmans will introduce the basics of artificial intelligence, knowledge-based systems, logic programming and the Prolog language to establish the groundwork for and a means to implement goal-oriented or hypothesis-driven programming. Next month in Part 2, Mr. Hopmans will discuss how Prolog works and how you program in Prolog.

The term artificial intelligence generally is used to describe the technology for dealing with knowledge (a superset of data.) Artificial intelligence (AI) is concerned with making machines more useful by causing them to mimic processes that, if performed by humans, would be considered intelligent. Many countries have significant, national-level Advanced Information Technology programs underway. This approach, called "technology push," focuses on the development of the technology for yet unspecified commercial applications. In contrast, most of the successfully implemented AI applications have resulted from demand or "market pull" for new solutions to existing problems.

AI is concerned with the study of systems that represent, acquire and use knowledge in order to perceive, reason, plan, act and use language. Some differences between biological and artificial intelligence are shown in *Figure 1.*

[By Ross G. Hopmans]

Knowledge-Based And Expert Systems

CONCENTRATING ON THE SIMULATION of human expertise has produced the most successful AI programs in the form of expert systems that help make decisions by exploiting scarce or expansive expertise. They require a lot of high quality, specific knowledge about a particular topic. Some characteristics of expert systems are shown in *Figure 2.*

An expert system can make deductions through inference, motivate its own actions and solutions, suggest alternatives to solutions and handle uncertain information.

The terms "knowledge-based systems" and "expert systems" often are used interchangeably, but their meanings are quite different. The term knowledge-

FIGURE 1

Biological Intelligence	Artificial Intelligence
perishable	permanent
difficult to transfer	easy to duplicate
erratic	consistent
difficult to reproduce	easy to document
creative	uninspired
learned	programmed
sensory input	symbolic input
wide context	narrow focus

Biological versus artificial intelligence.

FIGURE 2

Interpretation	inferring situation descriptions from sensor data
Prediction	inferring likely consequences of given situations
Diagnosis	inferring system malfunction from observations
Monitoring	comparing observations to expected outcomes
Advisor	expressing opinions after drawing from relevant facts

Characteristics of expert systems.

based systems describes an important technical issue: It indicates that the source of the program's power is primarily a large body of task-specific knowledge. Such systems may function in a variety of roles acting as assistants, colleagues and sometimes as experts.

The term expert systems refers primarily to an aspiration — the desire to have a system that works as well as a human expert.

Most of the interesting things we know about the world are not numeric and most of the knowledge we have about the world is not well modeled with arithmetic. We think and reason about problems using IF/THEN rules, but how do we capture these types of rules using arithmetic?

Knowledge-based systems take a particular view of the answer to the question: Why are experts experts? Do they think faster than the rest of us? Do they think differently? Do they have a general-purpose trick of thinking or problem solving? To call something a knowledge-based system subscribes to the belief that experts are experts because of what they know. Expertise arises from knowledge. The power of knowledge-based systems comes from their base of knowledge about the specific task at hand.

A knowledge-based expert system is a close approximation to cloning. What we cannot do biologically, we try to do intellectually. We take rare and valuable expertise and try to clone it by talking at length with the person who has it. It is useful because almost all organizations have a knowledge bottleneck — a place where its productivity is limited by a scarcity of knowledge and skill. Whom do you miss when they are sick? Whom would you hate to lose to the competition? Whose impending retirement has you worried? Whom do you wish you had five more of? Cloning that knowledge is one possible remedy to these problems and knowledge-based systems offer us this possibility. The focus of knowledge-based systems is on *knowledge* — collecting knowledge, formalizing knowledge and putting knowledge to work in the computer.

Why Use Knowledge-Based Systems

THE OLDEST EXPERT SYSTEM in commercial use configures computer systems. But that type of problem is not unique to the electronics or manufacturing industries. Contracts built from standard clauses and insurance policies built from standard coverage also need to be "assembled." In all cases, we want to ensure that all the needed parts are there, nothing is omitted, nothing extra is added and that they all function together smoothly. Thus this technology can span across industry sectors.

There is also the issue of corporate memory. We would like to retain human skill and have it outlive any single individual. Using knowledge-based technology, we can debrief the experts who have a lifetime of experience and capture a useful part of what they know — making more real the idea of corporate memory.

If the line of responsibility in a knowledge-based system falls mainly to the human, then the program is more of an assistant. If we can push that line of responsibility more to the machine end and make the program smarter, then that may be something we can call an expert system. Useful applica-

tions can fall anywhere along that line. We can take an evolutionary approach and start a program out as an assistant and add more knowledge over time to give the machine more responsibility.

How Do Knowledge-Based Systems Work?

KNOWLEDGE-BASED SYSTEMS are characterized by their reliance on large stores of rule-based knowledge as a basis of their expertise. In effect, we have done a dicing of the human expert's knowledge into individual rules. Rules are comprehensible, and each stands on its own feet. Each rule makes one small decision that relays one thing to do under a particular set of circumstances. We use a rule whenever it is relevant — that is, whenever its pre-conditions (the items in the IF part of the rule) have been met.

In traditional programming, we write complete decision-making procedures, whereas in AI, we write individual decision rules. Traditional programming tells the computer what to do; here, we tell it what to know. It turns out that a few hundred to a few thousand rules are adequate for capturing interesting, valuable and non-trivial skills.

A big difference between an expert system and a conventional system is that knowledge is stored in a knowledge base in the expert system, but coded into a program in the conventional approach. Program code is a very primitive way of storing knowledge. It is rigid, static and inaccessible.

The art of building knowledge-based systems is one of collecting and accumulating facts and rules. This collection comprises the knowledge base. The other component is the inference engine — that part of the program that uses the rules of the knowledge-based system and applies them to the problem at hand. The engine's primary job is to do symbolic inference. The separation of knowledge base and inference engine is characteristic of knowledge systems, but is atypical of traditional systems.

Knowledge-based systems can generate an explanation of their behavior, and the answer is comprehensible because the computer is doing symbolic inference and not arithmetic; reasoning and not calculation. We have turned the computer into a logical reasoning engine — a device whose basic operation is rule retrieval and application. Traditional applications are not, nor were they intended to be, models of human problem solving. Instead, they are powerful and have an important place, but they are not comprehensible necessarily.

As a result, knowledge-based systems have a property we call "transparency." When you look inside them, their operation makes sense to us. They are not black boxes. They reveal their line of reasoning, and it is sensible.

Eventually a knowledge-based system reaches a conclusion with a list of plausible alternatives for decision support. It just does not pick out one answer it thinks is best. Transparency allows us to ask how the program decided what is plausible, and it allows us to examine the audit trail in as much detail as we like.

THE STUDY OF SYMBOLIC LOGIC goes back to the work of Aristotle in the fourth century B.C. First order predicate logic is a branch of symbolic logic that has evolved largely in the twentieth century. It is a universal,

[KNOWLEDGE ACQUISITION]

We train people to have expertness, but not expertise. We call some people para-professionals — those who master sequences of activity but lack the generative capability for creating the sequences that true experts have. In a knowledge-based system we have to be certain that we are getting the expertise underlying the performance.

Experts guess a lot. They are effective at estimating things in ways that less expert people cannot begin to comprehend. They work quickly at hard problems and get things right most of the time.

But expertise is not just lots of experience. It involves the use of that experience to recognize key issues and ignore irrelevant ones. Human experts use macros that appear to be guesses. They cannot give IF/THEN rules or cause and effect rules directly. We expect them to reason intelligently rather than intuitively. The process tends to be invisible to the expert, and they lack self knowledge. This is known as the Knowledge Engineering Paradox.

Human beings have developed the capacity to recognize and store away the things we do often to long-term memory, like compiled programs, so we can run them in short-term memory with far less expenditure of resources. The problem is that we no longer know what they contain.

Experts look for the shortest distance from problem to solution. Past experiences provide the shortest path. If not, novel problems can be a good technique to get at the underlying principles analytically using deductive steps.

Heuristics are used to avoid "garden path" results. Experts have meta-rules that say "be careful at this point."

Experts can gain a greater awareness of their knowledge by working with a Knowledge Engineer. Knowledge Engineering can create new knowledge by illuminating tasks where experts made mistakes or overlooked important things.

abstract language for representing knowledge and solving problems. Logic programming is based on a subset of first order predicate logic.

Aristotle attempted to codify into a scientific system the way that knowledge most effectively could be pursued through rational debate. He wanted to establish a standard whereby the correctness of a line of reasoning could be established.

For instance, given the following two premises:

Socrates is Human.
Humans are Mortal.

then the following conclusion is valid:

Socrates is Mortal

The process of reaching a conclusion from the premise also is called making an inference. The above inference takes place because the predicate class of one statement matches the subject class of another. As a result of the inference, a new statement is formed out of the subject of one statement and the predicate of the other.

Logic provides a precise language for the expression of one's goals (or hypotheses), knowledge and assumptions. Logic provides the foundation for deducing consequences from premises, for studying the truth or falsity of statements given the truth or falsity of other statements, for establishing the consistency of one's claims and for verifying the validity of one's arguments.

Through logic programming, we can *prove* program correctness!

The above example can be proven correct through the simplest and most powerful of Aristotle's inference rules known as *modus ponenes* that states:

If P implies Q and P is true, then Q is true.

Restating our example in this format, we have a rule P implies Q, and a fact P as:

If a person is human then that person is mortal.
Socrates is Human.

or, more programmatically familiar:

If human (X) then mortal (X).
Human (Socrates).

We can conclude that *Socrates is Mortal.*

In this example, we applied a fact to a simple, comprehensible, general-purpose rule, and we were able to infer a new piece of information, which we can prove to be correct.

Although computers were intended for use by humans,

> Program code is a very primitive way of storing knowledge. It is rigid, static and inaccessible.

the language for expressing problems to the computer and instructing it how to solve them was designed from the perspective of the engineering of the computer alone.

Logic programming departs radically from the mainstream of computer languages. Rather than being derived from the von Neumann machine model, it is derived from an abstract model, which has no direct relationship or dependency to one machine model or another. It is based on the belief that, instead of teaching the human to think in terms of the operations of a computer (which some scientists and engineers at some point in history happened to find easy and cost-efficient to build), the computer should perform instructions that are easy for humans to provide.

Logic programming suggests that explicit instructions for operation not be given but rather the knowledge about the problem and assumptions that are sufficient to solve it be stated explicitly. This constitutes an alternative to the conventional program. The logic program can be executed by providing it with a hypothesis (or problem), formalized as a logical statement to be proven, called a goal statement. The execution is an attempt to solve the problem — that is, to prove the hypothesis given the assumptions in the logic program.

A major aim of logic programming is to enable the programmer to program at a higher level. Ideally, one should write axioms that define the desired relationships, maintaining ignorance of the way they are going to be used by the execution mechanism. Current logic programming languages such as Prolog, however, cannot ignore how their execution mechanisms work. Effective logic programming requires a certain implementation knowledge for effective execution.

Prolog

FIFTH GENERATION LANGUAGES are valuable because they help reduce the distance between the verbal description of a process and its representation in executable code. The resulting programs are thus easier to both read and change. The logical foundations of a program tend to be closer to the surface in fifth generation languages than in the more conventional languages.

Computer languages have evolved from low-level

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languages in which the programmer specifies *how* something is to be done toward high-level languages in which the programmer simply specifies *what* is to be done. Most languages, Lisp included, are "how-to" languages. Prolog breaks from that, encouraging the programmer to describe situations and problems, not the detailed means by which the problems are to be solved.

Prolog is a programming language centered around a small set of basic mechanisms, including pattern matching, tree-based data structuring and automatic backtracking. This small set constitutes a surprisingly powerful and flexible programming framework.

A Prolog program consists of a set of rules for deducing the truth of a given hypothesis (or goal) from a conjunction of other hypotheses. A set of rules with the same head represents alternative ways of establishing the same hypothesis. Such a set sometimes is called a procedure. Prolog procedures are analogous somewhat to procedures in mainstream languages and conceptually are like the *Case* statement. The goals in the body of a procedure are invoked sequentially, and a procedure is exited when all hypotheses in one of its rules have succeeded.

However, a fundamental difference in the flow of control arises when one of the hypotheses fails. Unlike mainstream languages that require failed statements to be handled explicitly, Prolog automatically backs up to the previous hypothesis, attempting to satisfy it in a different way. This behaviour is known as backtracking.

Programming in Prolog often consists of merely describing essential properties of a problem, defining the relations and rules applicable to the problem and stating known facts relevant to the problem. With conventional programming languages, the programmer has to spell out a detailed sequence of steps, which the computer must perform. The declarative style of programming made possible by Prolog is faster, easier and less error-prone.

Prolog's symbolic nature, dynamic memory management and flexible structure make it an ideal language for the rapid prototyping of virtually any kind of system, but Prolog especially is well suited for problems that involve objects — in particular, structured objects and relations between them.

The control structure in Prolog is unification or a pattern matching process operating on a sophisticated internal database that contains a full relational database. Data and programs are stored in this internal database, which is searched for solutions to goals. The Prolog system can search for alternative solutions (called non-determinism) by backtracking through the search space. Prolog programs in the database consist of statements that express relationships between entities. The "logical engine" in the Prolog system then runs the program by inferring true statements from the given relationships.

Unlike conventional languages, Prolog incorporates program control into the language itself. The programmer is relieved of the majority of the control of program flow and can focus on expressing data objects' relationships.

Prolog is not just another language; it may be THE language of the future. Prolog is based in logic, not on a mapping of the machine architecture. Prolog provides a "Procedural Interpretation" that defines how the problem should be solved with an algorithm and a "Declarative Interpretation" that describes the problems and what is known. It is the declarative interpretation that allows us to prove programs correct.

There currently is no universal Prolog standard. Over time, the implementation described by W.F. Clocksin and C.S. Mellish in *Programming in Prolog* (Springer-Verlag, 1985) has emerged as the de facto standard. — *Ross Hopmans is the manager of Artificial Intelligence Initiatives at Brant Computer Services Limited, Mississauga, Ontario, Canada.*

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Tricks Of The Trade

The Promise Of MPE/XL, Part 3

[BY EUGENE VOLOKH]

Editor's Note: In our August issue, Mr. Volokh introduced us to many of MPE/XL's new features. In the September issue, Mr. Volokh continued with an introduction of MPE/XL's input and output commands, looping capabilitities and command files. This month, he concludes with a few MPE/XL tricks of the trade.

We've pretty much covered all the things you can do straightforwardly with MPE/XL. Of course, if this were all I had to say, I'd never have written this article. People who know me know that I never do things straightforwardly.

MPE/V has a small set of things you can do easily and a far larger set of things you can do if you really stand the system on its head. MPE/XL, on the other hand, has a large set of things you can do easily and an even bigger set of things you can do with a little bit of trickery. This is where the fun begins.

Pausing For X Seconds

AT A CERTAIN POINT in your job stream, a particular file may be in use. You don't want this to abort the job. Rather, you want the job to suspend until the file is no longer in use.

A first attempt at this might be:

```
WHILE FINFO('MYFILE',fileisinuseflag) DO
    PAUSE one minute
ENDWHILE
```

While the file is in use (surely there must be an FINFO option for this!), pause for a minute,

and then check again. This shouldn't be too much of a load on the system (though without the :PAUSE this would be a heavy CPU hog indeed!).

Of course, you face two problems. First of all, there is no FINFO option to check to see if the file is in use or not. Old MPE programming hands, however, shouldn't despair:

```
FILE CHECKER=MYFILE;ACC=OUTKEEP;SAVE;EXC
SETJCW CIERROR=0
CONTINUE
PURGE *CHECKER
WHILE CIERROR=384 DO
    PAUSE one minute
    SETJCW CIERROR=0
    CONTINUE
    PURGE *CHECKER
ENDWHILE
```

See what we're doing? The :FILE equation tells the file system to open the file with ;ACC=OUTKEEP so the data won't get deleted and close it with disposition ;SAVE so the file itself won't get purged. The :PURGE command thus will not purge the file at all, but just try to open it with the exclusive option. As long as the :PURGE is failing, we know that the file is in use, unless, of course, it doesn't exist or we're getting a security violation.

We do this check once before the :WHILE loop. Then, if CIERROR=384 indicating that :PURGE couldn't open the file exclusively, we pause for a minute, do the check again and keep going until the check succeeds.

The only problem that remains is, of course, that MPE/XL as of Release 1.1 has no :PAUSE command. Without it, the entire exercise is academic.

What can we do? Well, one solution is to write a program. Call it PAUSE.PUB.SYS. It'll take a ;PARM= value, convert it to a real number and call the PAUSE intrinsic. Then, any of your command files could say:

```
:RUN PAUSE.PUB.SYS;PARM=60
```

or just use the implied :RUN, as in:

```
:PAUSE ,60
```

I don't like this. I don't like it for several reasons.

■ *The program, though not by any means difficult, is not trivial to write. If you know SPL, it's only a few lines. What if you only know COBOL? It's a nightmare to call the PAUSE intrinsic from COBOL, in which handling real numbers requires a lot more work than one would care to do.*

From FORTRAN, you could call PAUSE, but you'd also need to call the GETINFO intrinsic. What if you had to write a program that checked to see if the file was in use?

You'd have to call FOPEN, figure out the right foptions and aoptions bits (%1 and %100, if you're curious) and then use an intrinsic to set a JCW appropriately.

■ *Once you write it, you have to keep track of it. You put its object code into PAUSE.PUB.SYS. Where do you keep the source code? What if you lose it? Will you write documentation for it, or add a HELP option?*

■ *Finally, the more external programs you use, the less self-contained the job stream will be. What if you move the job to one of your machines? You'll have to move the PAUSE program, too, and probably its source code and documentation, just to be safe.*

For vendors the problem becomes even greater. Our installation job stream has to be able to run on a system where none of our software currently exists. We can't rely on your PAUSE.PUB.SYS or what have you.

You might agree with me, or you might not. It's quite possible that the only problem with an external program file is that it somehow affects some silly aesthetic sense of mine. In any event, here's my answer to the problem:

```
:BUILD MSGFILE;TEMP;MSG
:FILE MSGFILE,OLDTEMP
:RUN  FCOPY.PUB.SYS;STDIN=*MSGFILE;INFO="":INPUT
    DUMMY;WAIT=60"
```

I build a temporary message file called MSGFILE, and then I run FCOPY with ;STDIN= redirected to it. Then, I tell FCOPY to execute an :INPUT command, telling it to WAIT for 60 seconds for input. Of course, the only reason I use FCOPY here is to have it execute the MPE/XL command "INPUT DUMMY;WAIT=60". FCOPY's convenient for this because we can pass the command to it as an INFO= string.

Of course, the input never will come, since MSGFILE is empty. I must admit that the :INPUT ;WAIT= parameter almost certainly was intended to wait for terminal input. However, it also works perfectly well when the input is coming from a $STDIN file that was redirected to a message file. When the 60 seconds are up, the :INPUT command will terminate and return control to FCOPY, which then will return to the CI.

Now, our job stream is complete:

```
:BUILD MSGFILE;TEMP;MSG
:FILE MSGFILE,OLDTEMP
:FILE CHECKER=MYFILE;ACC=OUTKEEP;SAVE;EXC
:SETJCW CIERROR=0
:CONTINUE
:PURGE *CHECKER
:WHILE CIERROR=384 DO
:     RUN FCOPY.PUB.SYS;STDIN=*MSGFILE;INFO="":INPUT
        DUMMY;WAIT=60"
:     SETJCW CIERROR=0
:     CONTINUE
```

```
    PURGE *CHECKER
:ENDWHILE
```

Some may say that only a computer freak can think that the above solution is simpler than just running a program that loops doing FOPENs and PAUSEs.

They may be right.

Reading A File

THE :REPORT COMMAND NICELY shows you all the disc space used by each account on the system. Actually, on MPE/XL V1.0 the disc space :REPORTed is sometimes erroneous, but I'm sure that'll be fixed soon. Unfortunately, it doesn't show you the total disc space used in the entire system, which is a useful piece of information.

The :REPORT command can send its output to a file, which is good. But, what can you do to read the file?

Well, let's start at the beginning. First, let's do a :REPORT into a disc file:

```
:FILE REPOUT;REC=-80,16,F,ASCII;NOCCTL;TEMP
:CONTINUE
:REPORT XXXXXXXX.@;*REPOUT
```

What's the XXXXXXXX.@ for? The :REPORT command usually outputs information on accounts and on groups. In our case, we don't want to have any group information at all. By specifying a group that we know doesn't exist in any account, we can make MPE output only the account information and no group information. It'll also print an error, NONEXISTENT GROUP, but that's OK.

Now, we have a temporary file called REPOUT, which contains two header lines and one line for each account. We'd like to extract the number of sectors used from each account line and add everything up. This is where the real trickery comes in.

One thing we might do is use EDITOR. The principle here is that we'll take the :REPORT listing, which looks like:

```
ADMIN      15502    **    1046    **    8372    **
CUST        3062    **       0    **       0    **
DEV         7080    **      18    **       8    **
```

and massage it into a sequence of MPE/XL commands:

```
:SETVAR TOTALSPACE TOTALSPACE+ 15502
:SETVAR TOTALSPACE TOTALSPACE+  3062
:SETVAR TOTALSPACE TOTALSPACE+  7080
...
```

We then can execute all these commands, and TOTALSPACE will be the total used disc space count.

This is simple:

```
:PURGE REPOUT;TEMP
:FILE REPOUT;REC=-80,16,F,ASCII;NOCCTL;TEMP
:CONTINUE
:REPORT XXXXXXXX.@;*REPOUT
:SETVAR TOTALSPACE 0
:EDITOR
/TEXT REPOUT
/DELETE 1/2                    << delete the header lines >>
/CHANGE 23/72,"";ALL << delete everything right of the
    count >>
/CHANGE 1/8,":SETVAR TOTALSPACE TOTALSPACE+"
<< delete the left >>
<< now, each line looks like: >>
<< :SETVAR TOTALSPACE TOTALSPACE+ 15502 >>
/KEEP REPUSE,UNN
/USE REPUSE                    << execute the :SETVARs >>
/EXIT
```

Now, the TOTALSPACE variable is set to the total disc space.

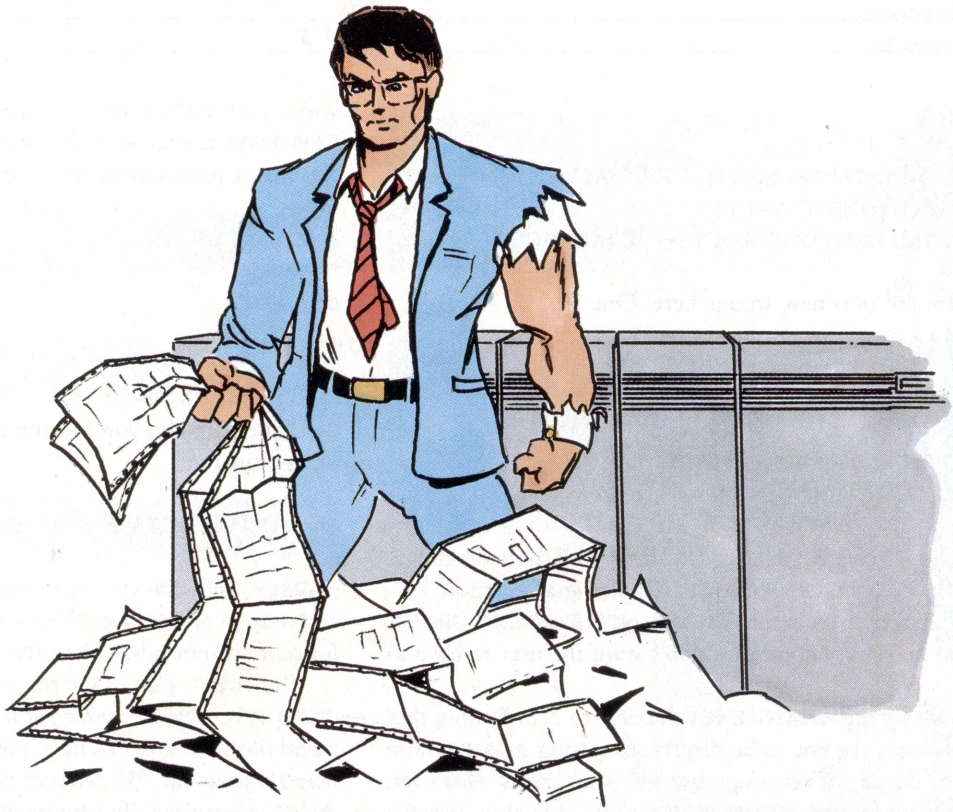
This is similar to what we did in pre-MPE/XL MPE programming. We used EDITOR as a means of taking a program's or a command's output and making it another program's (in this case, also EDITOR's) input. In fact, UNIX's "sed" editor very frequently is used for this purpose by UNIX programmers, although it's much more adapted to this than EDITOR/3000 is.

The trouble with this solution is that it's inherently limited to plain textual substitution. What if we wanted to sum the disc space of all accounts that used more than 20,000 sectors? EDITOR has no command that easily can check the value of a particular field in a line. What we'd really like to do is use all the power of MPE/XL's :WHILE loop and expressions to process the :REPORT listing one line at a time.

As I mentioned before, MPE/XL unfortunately has no "get a record from a file" function. However, not all is lost.

Let's set up two command files. The first, TOTSPACE, will look like this:

```
FILE REPOUT;REC=-80,16,F,ASCII;NOCCTL;TEMP
SETVAR OLDMSGFENCE HPMSGFENCE
SETVAR HPMSGFENCE 2
PURGE REPOUT;TEMP
CONTINUE
REPORT XXXXXXXX.@;*REPOUT
SETVAR HPMSGFENCE OLDMSGFENCE
FILE REPOUT;OLDTEMP
```



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```
CONTINUE
RUNCI.PUB.SYS;PARM=3;INFO="TOTSPAC2";STDIN=
    *REPOUT;STDLIST=$NULL
ECHO TOTAL USED DISC SPACE = !TOTALSPACE
```

There are two new things here. One is:

```
SETVAR OLDMSGFENCE HPMSGFENCE
SETVAR HPMSGFENCE 2
CONTINUE
REPORT XXXXXXXX.@;*REPOUT
SETVAR HPMSGFENCE OLDMSGFENCE
```

What's all this HPMSGFENCE stuff? Well, remember that the REPORT XXXXXXXX.@;*REPOUT command almost certainly will output an error message, NONEXISTENT GROUP. This is to be expected, and we don't want the user to have to see this.

So, we set the HPMSGFENCE variable to 2, indicating that error messages are not to be displayed. Setting it to 1 would inhibit the display of warnings, but still print errors. However, since we want to reset HPMSGFENCE to its old value later, we save the old value of HPMSGFENCE, set the value to 1, do the command and then reset the old value.

Personally, I think that this is a bit more effort than required. I simply added a new command called %NOMSG; saying:

```
%NOMSG REPORT XXXXXXXX.@;*REPOUT
```

This executes the :REPORT command without printing any messages. Similarly, HP could have had a :NOMSG command for suppressing errors and warnings and a :NOWARN command for suppressing only warnings. This would have saved all the bother of saving the old HPMSGFENCE, setting it and resetting it. In fact, to be really clean, I should even do a:

```
:DELETEVAR OLDMSGFENCE
```

after doing the :SETVAR HPMSGFENCE OLDMSGFENCE.

In any case, the HPMSGFENCE solution is better than no solution at all. In MPE/V, the warning message always would be displayed, and users might get quite confused by it.

The only other little trick (in this command file) is:

```
RUNCI.PUB.SYS;PARM=3;INFO="TOTSPAC2";STDIN=
    *REPOUT;STDLIST=$NULL
```

In MPE/XL, the CI is not some special piece of code kept in the system SL. Rather, it's a normal program file called CI.PUB.SYS. When a job or a session starts up, the system creates a new CI.PUB.SYS process on the job/session's behalf. However, CI.PUB.SYS is also :RUNable just like any other program. You can run it interactively by saying:

```
:RUN CI.PUB.SYS
```

or just:

```
:CI
```

Alternatively, you can run it and tell it to execute exactly one command:

```
:RUN CI.PUB.SYS;PARM=3;INFO=" command to be executed"
```

;PARM=3 tells the CI not to display the :WELCOME message and only to process the ;INFO= command, rather than prompt for more commands. Other ;PARM= values do different things.

In our case, we're running CI.PUB.SYS with ;INFO="TOTSPAC2", telling it to execute our TOTSPAC2 command file, and with ;STDIN= redirected to our :REPORT command output file. We redirect ;STDLIST= to $NULL, because the CI otherwise will echo its ;INFO= command, :TOTSPAC2, before executing it.

Now we can see what TOTSPAC2 contains:

```
INPUT DUMMY        << to skip the first header line >>
INPUT DUMMY    << to skip the second header line >>
SETVAR TOTALSPACE 0
SETVAR HPMSGFENCE 2 << to ignore any error messages >>
WHILE TRUE DO          << loop until we get an error >>
  INPUT REPORTLINE    << get a :REPORT detail line >>
    << extract the disc space - 15 columns starting with >>
    << column 9 — and add it to TOTALSPACE >>
    SETVAR TOTALSPACE TOTALSPACE +
![STR(REPORTLINE,9,15)]
ENDWHILE
```

See the trick? CI.PUB.SYS's ;STDIN= is redirected to a disc file, so all :INPUT commands will read from that disc file. For each line we read in, we extract the account disc space (STR(REPORTLINE,9,15)) and do a:

```
:SETVAR TOTALSPACE TOTALSPACE + extracted__
account__disc__space
```

When we run out of input lines, the :INPUT command will get an EOF condition, and the command file will stop executing. TOTALSPACE now is set to the total disc space.

Both the EDITOR and the two-command-files solution can be used online, though both require two files. The first approach would require a disc file that contains all the required EDITOR commands. In a job, the EDITOR approach can be completely

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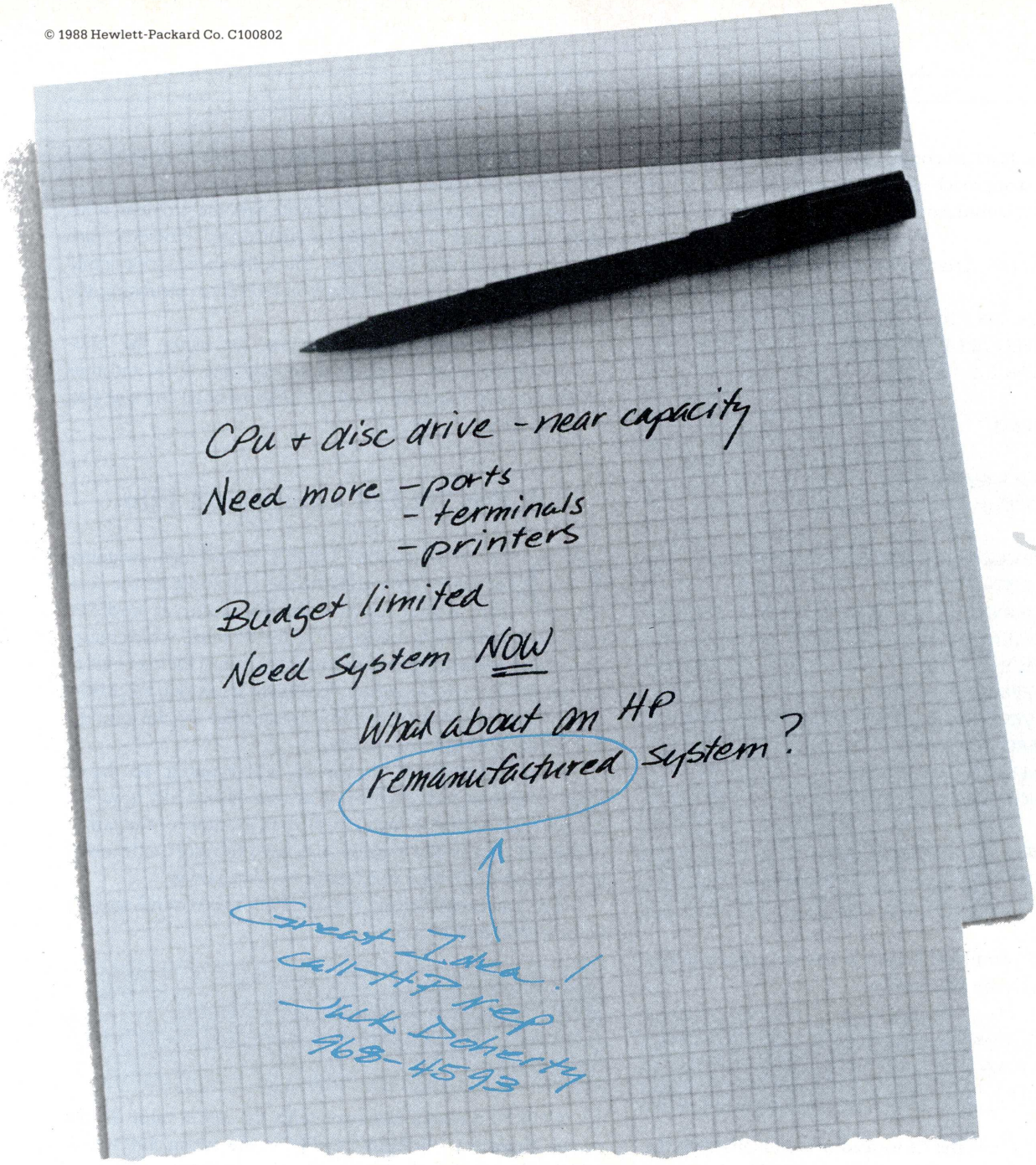

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self-contained. The EDITOR commands can be put into the job stream. The second approach also can be self-contained if you create the TOTSPAC2 command file within the job using EDITOR or FCOPY.

Finally, one more variation on the same theme:

```
FILE REPOUT;REC=-248,,V,ASCII;NOCCTL;MSG;TEMP
SETVAR OLDMSGFENCE HPMSGFENCE
SETVAR HPMSGFENCE 2
CONTINUE
PURGE REPOUT;TEMP
CONTINUE
REPORT XXXXXXXX.@;*REPOUT
FILE REPOUT;OLDTEMP
CONTINUE
RUN CI.PUB.SYS;PARM=3;INFO="INPUT DUMMY";STDIN=
    *REPOUT;STDLIST=$NULL
RUN CI.PUB.SYS;PARM=3;INFO="INPUT DUMMY" ;STDIN=
    *REPOUT;STDLIST=$NULL
SETVAR TOTALSPACE 0
WHILE FINFO('*REPOUT',19)>0 DO
    RUN CI.PUB.SYS;PARM=3;INFO="INPUT REPORTLINE";
      STDIN=*REPOUT;&STDLIST=$NULL
    SETVAR TOTALSPACE TOTALSPACE +
      ![STR(REPORTLINE,9,15)]
ENDWHILE
SETVAR HPMSGFENCE OLDMSGFENCE
ECHO TOTAL USED DISC SPACE = !TOTALSPACE
```

The :REPORT command output is sent to a message file. To read a line from the file, we say:

```
RUN CI.PUB.SYS;PARM=3;INFO="INPUT REPORTLINE";
    STDIN=*REPOUT;&
    STDLIST=$NULL
```

This essentially tells the CI to read into REPORTLINE the first record from *REPOUT. Since it's a message file, the record will be read and deleted; the next read will read the next record.

We loop while FINFO('*REPOUT',19) — REPOUT's end of file — is greater than 0. When the file is emptied out, we stop.

This is entirely self-contained, and in some respects more versatile. We can, for instance, prompt the user for input in the middle of the :WHILE loop, since our $STDIN is not redirected. The output-to-a-message-file and run-the-CI-to-get-each-record constructs are essentially a poor man's FREAD function. On the other hand, this approach runs CI.PUB.SYS once for each file. Even on a Spectrum this'll take some time!

There is one other glitch. Each one of those :RUNs normally would print one of those pesky END OF PROGRAM messages. In MPE/XL, you can avoid them, as long as you use an implied :RUN rather than an explicit :RUN command. We can't use an implied :RUN because we need to redirect the STDIN and STDLIST.

Setting HPMSGFENCE to 2 almost fixes the problem; it inhibits the printing of the "END OF PROGRAM." However, each RUN still outputs two blank lines. Thus, the above script would print a couple of screens of blank lines before calculating the result.

This is another good argument for using the two-command-file solution, which does only one :RUN and thus prints out only one END OF PROGRAM message and one pair of blank lines.

A PSCREEN Command File

ONE OF THE MOST USEFUL contributed programs for the HP 3000 is PSCREEN, which copies the contents of your screen to the line printer. It works by outputting an ESCAPE-d sequence to the terminal, which causes almost any HP terminal to send back (as input) the contents of the current line on the screen. PSCREEN sends one ESCAPE-d for each line, picks up the output transmitted by the terminal and prints it to the line printer.

Now, PSCREEN is already up and running, so there's really no reason to implement it as a command file; however, it's quite interesting to try it, both as an example of the power of MPE/XL and of the trickery you need to resort to in order to work around some restrictions on that power.

The process of reading the data from the terminal actually is quite straightforward:

```
CALC CHR(27)+'H'
WHILE there are more lines on the screen DO
    INPUT CURRENTLINE;PROMPT=![CHR(27)+"d"]
ENDWHILE
```

CHR(27) means a character with the ASCII value 27, the escape character. "![CHR(27)+'d']" is the string ESCAPE-d, which when sent to the terminal by the ;PROMPT= will cause the terminal to input, into CURRENTLINE, the current line on the screen. The CALC command outputs ESCAPE-H (home up) to send the cursor to the top of the screen.

Actually, it turns out that we can't just display the home-up sequence in the :CALC because :CALC then will output a carriage return and line feed, and we'll skip the first line on the screen. Instead, we have to incorporate the ESCAPE-H into the first :INPUT command prompt.

The only twist here, one that the "real" PSCREEN has to deal with, too, is finding out how many lines there are on the screen. If we send an ESCAPE-d after we've already read the last data line, the terminal will send us a blank line and will be happy to do this forever.

There are two ways of solving this problem. One is to out-

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put at the very beginning some sort of marker to the terminal, for example, "*** PSCREEN END OF MEMORY ***". Then, we can keep INPUTing until we get this marker line, at which point we know we're done. We also then should erase the tag line so that subsequent PSCREENs won't run into it.

Another solution is to ask the terminal. If we say:

```
INPUT PROMPT="![CHR(27)+'F'+CHR(27)+'a']";
    NAME=CURSORPOS
```

then the terminal will be sent an ESCAPE-F (HOME DOWN, i.e., go to the end of memory) and an ESCAPE-a. The ESCAPE-a will ask it to transmit information on the current cursor position in the format "!&a888c999R", where the "!" is an escape character, the "888" is the column number and the "999" is the row number. This string will be input into the variable CURSORPOS. Then, the value of the expression:

```
![STR(CURSORPOS,8,3)]
```

will be the row number of the bottom of the screen.

The old PSCREEN uses the first approach (write a marker), probably because it's more resilient. I suspect that some old terminal over some strange datacomm connection can't handle the ESCAPE-a sequence right.

In any event, reading the data from the screen isn't that hard. The question is: How can we output it to the printer?

As we showed in our previous discussion, it's quite hard to read data from a file into a variable. It's harder still to output the data from a variable to a file.

The solution lies in running CI.PUB.SYS with ;STDLIST= redirected, thus letting the :ECHO command output to a file rather than to the terminal. This is much like doing file input by running CI.PUB.SYS with ;STDIN= redirected. Here's what the full PSCREEN script actually looks like:

```
SETVAR PSCREENTERM "*** PSCREEN MARKER ***"
ECHO !PSCREENTERM
SETVAR PSCREENLINE 0
INPUT   PSCREEN!PSCREENLINE;PROMPT="![CHR(27)+'H'+
    CHR(27)+'d']"
WHILE PSCREEN!PSCREENLINE <> PSCREENTERM DO
    SETVAR PSCREENLINE PSCREENLINE+1
    INPUT  PSCREEN!PSCREENLINE;PROMPT="![CHR(27)+'d']"
ENDWHILE
CALC CHR(27)+"A"+CHR(27)+"K"    << clear the PSCREEN
    MARKER line >>
FILE PSCROUT;DEV=LP
RUN   CI.PUB.SYS;PARM=3;INFO="PSCREENX";STDLIST=
    *PSCROUT
RESET PSCROUT
DELETEVAR PSCREEN@
```

Note that we're reading all the lines into variables called PSCREEN0, PSCREEN1, PSCREEN2, PSCREEN3, etc. These variables then will be read by the PSCREENX command file, which looks like this:

```
SETVAR PSCREENI 0
WHILE PSCREENI<PSCREENLINE DO
    ECHO ![PSCREEN!PSCREENI]
    SETVAR PSCREENI PSCREENI+1
ENDWHILE
```

There you have it. Again, the PSCREEN program works just fine, probably even better than these command files, but this is just an example of the kind of things you can do.

One little glitch you'll run into with these command files is that the first line of every printout will read ":PSCREENX". That's because CI.PUB.SYS will echo its ;INFO= command to the ;STDLIST= file. For PSCREEN, this should be fairly harmless; however, what if you simply want to write the contents of a variable to a disc file without the echoing getting in the way?

The solution is this:

```
PURGE TEMPOUT, TEMP
BUILD TEMPOUT;NOCCTL;REC=-508,,V,ASCII;TEMP
FILE TEMPOUT,OLDTEMP;SHR;GMULTI;ACC=APPEND
RUN CI.PUB.SYS;INFO="ECHO !MYVAR";STDLIST=*TEMPOUT
FILE TEMPOUT,OLDTEMP
FILE DISCFILE;ACC=APPEND
PRINT *TEMPOUT;OUT=*DISCFILE;START=3
```

We run the CI and tell it to echo the variable MYVAR to a temporary file called TEMPOUT. Then we do a :PRINT command, a new feature of MPE/XL, that appends to DISCFILE the contents of TEMPOUT starting with record #3. Record #1 is CI.PUB.SYS's echo of the ":" prompt; record #2 is its echo of the "ECHO !MYVAR" command; record #3 is the actual contents MYVAR variable.

What a bother, and relatively slow, too. That's why we ran the CI only once in the PSCREEN script. A built-in MPE/XL FWRITE function would have been so much simpler.

Expressions And Programs

ONE OF THE MOST INTERESTING possibilities of the MPE/XL command interface has nothing to do with command files (or UDCs or job streams) at all. I've never seen it implemented before, so it might have a good deal of practical problems; however, I think that it has a lot of potential for power.

Consider a program that prints the contents of one of your specially-formatted data files. If it were a database, you

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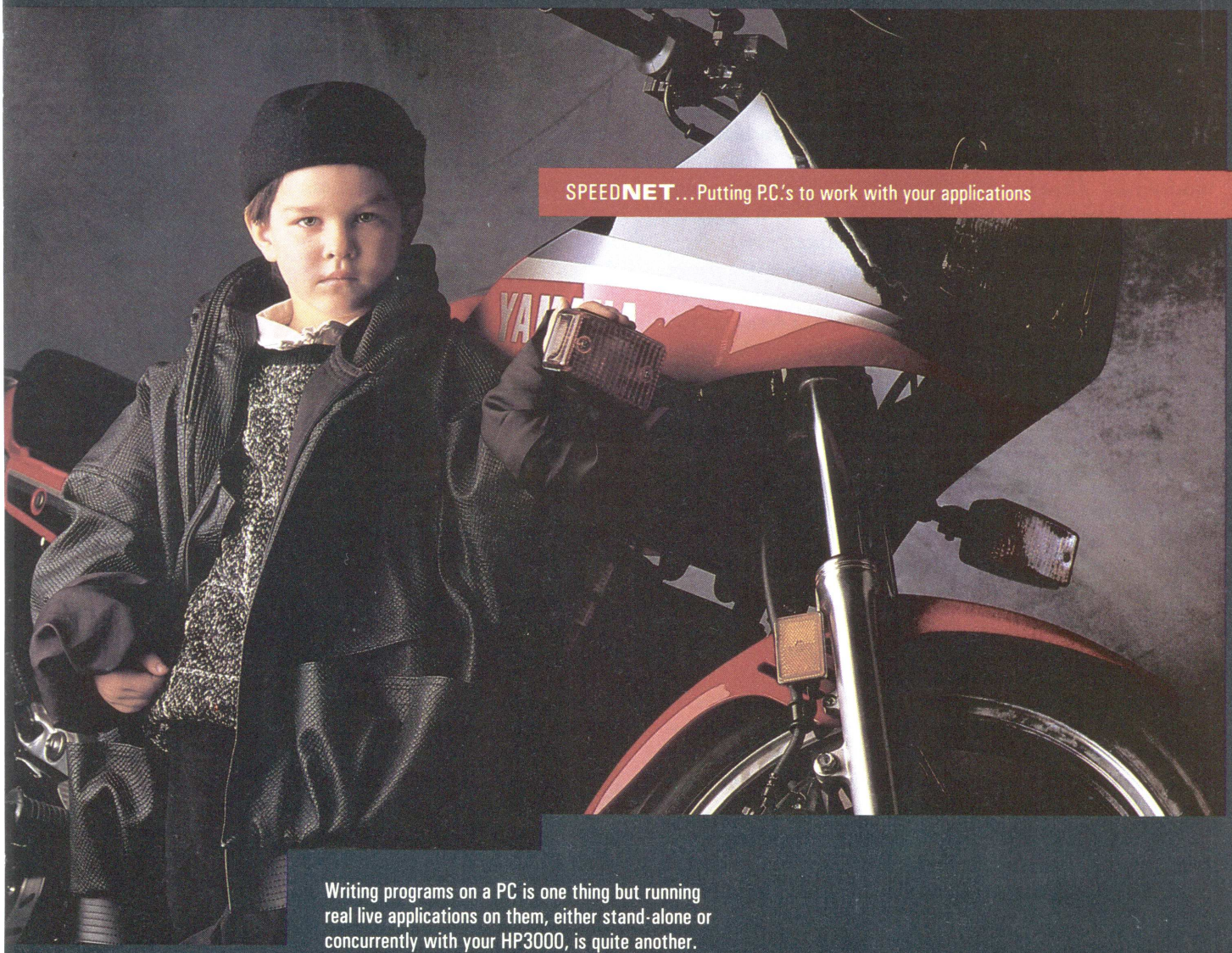

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could use QUERY, with its fairly sophisticated selection conditions. You could specify exactly what records you want to select.

However, if you're writing a special custom-made program, how can you let the user specify the records to be selected? There are 1,000 records in the file (17 pages at 60 lines per page), and the user only wants a few of them. If you don't put in some sort of selection condition, the user won't be happy; if you put in the ability to select on one particular field, I'll bet you that the user will start asking for selection on another field. What about ANDs? ORs? arithmetic expressions (SALARY<>BASERATE+BONUSRATE)? Soon they'll be asking for you to write your own expression parser!

What you really want is a generalized expression parser usable by any subsystem that wants to have user-specified selection conditions and user-specified output formats. You could tell it about the variables that you have defined. For example, define one variable for each field in the file, plus some other variables for some calculated values that the user may find handy. Then, you tell it to evaluate a user-supplied expression.

Think of all the various programs that could use this.

- *V/3000 could have used this for the input field validity checks rather than having its own parser.*
- *QUERY could have used this for the >FIND command rather than having its own parser, which, incidentally, can't handle parenthesized expressions.*
- *MPE/V could have used it for the :IF command logical expressions.*
- *LISTLOG could have used it to let you select log records.*
- *QUERY could have used it to output expression values in >REPORTs rather than have that silly assembly-language-style register mechanism.*
- *EDITOR or FCOPY could have implemented a smart string search mechanism (find all lines that contain "ABC" or "DEF").*

HP could have saved itself man-years of extra effort, while at the same time standardizing those expression evaluators that exist and implementing expression evaluation in a lot of places that need it.

The point here is that with MPE/XL you can, in a way, do this yourself. Take that file-reader-and-printer program of yours and prompt the user for a selection condition. Then, for each file record, use the HPCIPUTVAR intrinsic, or pass the COMMAND intrinsic a :SETVAR command to set an MPE/XL variable for each field in the record. Now, do a:

```
:SETVAR SELECTIONRESULT expression_input_by_the_user
```

Finally, do an HPCIGETVAR to get the value of the SELECTIONRESULT variable. If it's TRUE, the record should be selected, if it's FALSE, rejected.

In other words, you're using the :SETVAR commands expression handling to do the work for you. You set MPE/XL variables for all the fields in your record, and the user then can use those variables inside the selection condition. The condition can use all the MPE/XL functions — =, <>, <, >, +, -, STR, POS, UPS, etc. It also can reference integer, string or BOOLEAN variables. A sample run of the program might be:

Chameleon
Taurus Software
770 Welch Road
Palo Alto, CA 94304
CIRCLE 285 ON READER CARD

MPEX/3000 V2.0, STREAMX
VESOFT
1135 S. Beverly Dr.
Los Angeles, CA 90035
CIRCLE 284 ON READER CARD


```
:RUN SELFILE
```

This program, SELFILE version 1.5, prints selected records from the PS010 KSAM file; please enter your selection condition:

```
>UPS(STATUS)<>"XX" AND WORK_HOURS*HOURLY_
  SALARY>=10000
```

Meantime, the program is doing:

```
FOR each record from PS010 DO
    BEGIN
    :SETVAR STATUS value_of_status_field
    :SETVAR NAME value_of_name_field
    :SETVAR WORK_HOURS value_of_work_hours_field
    :SETVAR HOURLY_SALARY value_of_hourly_salary
      _field
    :SETVAR DEPARTMENT value_of_department_field
    ...
    :SETVAR SELECTIONRESULT &
      UPS(STATUS)<>"XX" AND WORK_HOURS*HOURLY
      _SALARY>=10000
    IF value of SELECTIONRESULT variable = TRUE THEN
       output the record;
    END;
```

The :SETVAR commands in the pseudo-code probably should be calls to the HPCIPUTVAR intrinsic.

There are several non-trivial problems with this approach:

- *You're restricted to INTEGER, STRING and BOOLEAN variables — no dates, reals, etc.*
- *You're restricted to those functions that MPE/XL provides, which are rather limited, though fairly powerful.*
- *Most importantly, all those intrinsic calls will take some time. If you're reading through a 100,000 record file, you might encounter some serious performance problems.*

To the best of my knowledge nobody's ever implemented this sort of facility. For all I know, it may not be feasible. However, I suspect that for quick-and-dirty query programs, and also input checking, output formatting, etc., where per-

formance is not a major consideration, it can be very powerful. You can use it to give a lot of control to the user, with very little programming effort on your own part.

From An Overall Perspective

THE MPE/XL USER INTERFACE is much more powerful and much more convenient than the classic MPE interface. (I didn't even go into some features, like multiline :REDO, which are convenient.) It allows you to do many things that used to require a lot of effort; however, some key features unfortunately are missing.

Fortunately, with a little bit of ingenuity, even the apparently impossible can be achieved. I'd be happy if all this article did was let you know that there are possibilities to MPE/XL beyond those that are apparent at first glance. We HP programmers did some pretty amazing things with the limited capabilities that classic MPE offered us. With MPE/XL, we should be able to write some very powerful stuff.

One thing that the new MPE/XL features should do is whet the appetites of all the poor people who still have to stick with MPE/V, or, heaven forbid, MPE/IV. After seeing all those wonderful things on the new machines, how can we bear to live with the old stuff?

There actually are two products out now that implement MPE/XL functionality on MPE/V: one called Chameleon, from Taurus Software Inc., and VESOFT's own MPEX/3000. MPEX, of course, does MPE/XL emulation in addition to all the other stuff that MPEX has always done — fileset handling, %ALTFILE, new %LISTF modes, the MPEX program hook facility, etc.

VESOFT's STREAMX also implements many MPE/XL-like features, including variables, :WHILE loops, expressions, etc., for job stream submission, an area unfortunately neglected by HP. Personally, I think that variable input, expression evaluation, input checking, etc., are even more useful at job stream submission time than they are in session mode and at job stream execution time. — *Eugene Volokh is vice president of research and development at VESOFT, Los Angeles, CA.*

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OLTP And Computer-Aid Programming

Bringing The Power Of CAD/CAM To Programming

On-line transaction processing (OLTP) is one of the fastest growing segments of the computer industry. It is a very demanding data processing operation, that can be installed on small systems and worldwide networks. OLTP is a technique for updating information continually from terminals, such as those used for automated teller machines, ticket reservation systems or keeping track of factory inventories.

Airline and hotel reservation networks, as well as bank automated teller machine networks, rely on OLTP systems to support high-volume data input from remote terminals and real-time updates to databases.

OLTP has numerous applications *(see Figure 1)*.

Most OLTP systems are centralized, requiring one computer to process all tasks, from data entry to database updates.

Because of the huge amount of transactions (sometimes over 2,000 per second) with on-line sales exceeding $2 million an hour, and a penalty of over $30 for each second the system is down, it is important that the hardware for OLTP operates at over 99.95 percent uptime. A solution for this requirement is a fault tolerant system.

There exists now on the market distributed remote database management systems (RDBMS) that surmount the demands of OLTP and mesh with workstations. Users must be able to read, write and update data anywhere in the network, with full data protection. The user can change the rules of the database on-line, across the network. While many RDBMS let the user make on-line changes at the data level, on some systems the user can change the rules and effect that change across the network without any interruption. That's because the rules are enforced centrally in the database. The user makes changes in one location for the entire network.

[BY DR. MICHAEL M. DEDIU]

OLTP is characterized by speed. The OLTP databases are built on the requester/server model, suiting them to the multiprocessor architecture. This makes it simple to add requesters and servers as the business expands, without diminishing performance. The OLTP databases offer full data integrity, distributed processing and easy modular growth.

Some OLTP databases let you integrate applications with a broad range of workstations. Utilizing UNIX-based workstations, IBM PCs, PS/2s and Macintoshes as intelligent workstations, OLTP can be brought to the local level. Here is an important opportunity for HP computers.

A software product, like OLTP, in contrast to software development for personal use, has multiple users and often has multiple developers and maintainers. In most cases, the developers, users and maintainers are distinct entities. Development and maintenance of software products thus requires a more systematic approach than is necessary for personal software.

In order to develop a software product, user needs and constraints must be determined and explicitly stated; the product must be designed to accommodate implementors, users and maintainers; the source code must be implemented carefully and thoroughly tested; and supporting documents such as the principles of operation, the user's manual, installation instructions, training aids and maintenance documents must be prepared.

Software maintenance tasks in-

clude the analysis of change requests, redesign and modification of the source code through testing of the modified code, updating of documents and documentation to reflect the change and the distribution of the products to appropriate user sites.

The need for systematic approaches to development and maintenance of computer software products became apparent in the 1960s. During that decade, third-generation computing hardware was invented, and the software techniques of multiprogramming and time-sharing were developed. These capabilities provided the technology for the implementation of interactive, multiuser, on-line and real-time computing systems for airline reservations, medical information, navigational guidance and military command and control.

Because of the worldwide intensive use of computers, we need tools to address every phase of the information-systems life cycle. Computer-Aided Programming (CAP) is a full life-cycle collection of tools for analyzing, planning, designing, coding, installing and maintaining systems, faster than ever before.

The planning tool of CAP identifies competitive opportunities, and the entire integrated product gives users automation from early diagrams to finished code, which is a significant gain in productivity. CAP is similar to bringing the power of CAD/CAM to programming.

The planning tool of CAP provides an automated system for project estimating, work planning, project control and management change control. The tool for system design is a dictionary-based system for analysts and designers to develop data flow diagrams, paint screens and reports, plus facilitate data design and maintenance. The tool for code generation and maintenance uses the previous design specifications and generates a production program. It promotes standardization during the development process by generating everything necessary for on-line transaction processing (OLTP): records, screens, SQL, logic and copybooks. Configuration management and testing aids complete the system. When maintenance is required, changes are resolved throughout the system automatically. The nucleus of CAP is a central repository (database) containing an active data dictionary that ties the components together.

The best way to improve productivity and quality is through automation. Computer-Aided Programming (CAP) proves this is true for software tools.

CAP is a combination of techniques and tools aimed at building and maintaining software systems of all types: large and small, commercial and scientific, on-line and real-time embedded (like OLTP). CAP tools provide full coverage of the software life cycle by providing auto analysis, design, coding, implementation and maintenance, as well as project management software systems.

Original CAP concepts were based on the familiar top-down technique of software engineering, where the requirements for a new system are studied carefully and documented by the business analysts and, after final approval by management, given for partition. There, the data and systems analysts create functional specifications defining what is to be accomplished. The file and database designer and programmer then must define how the business requirements are to be satisfied. Once the file and database design and programs are completed and compiled, the design then is given over the partition for a third time to the operations people.

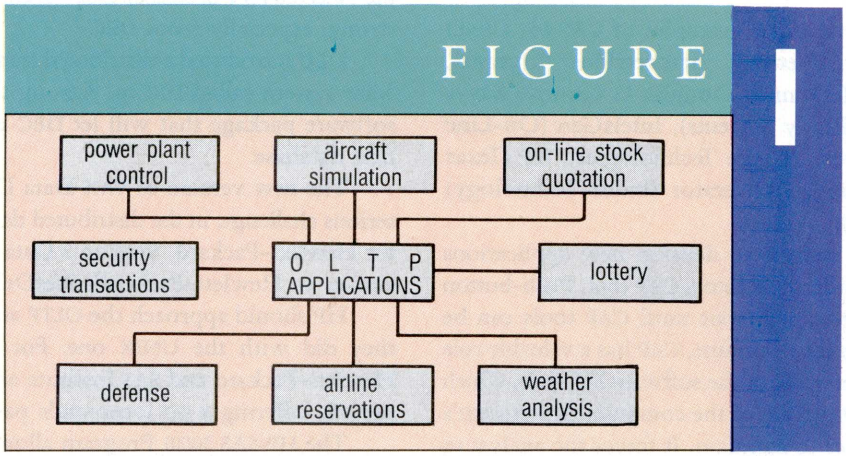
Many CAP tools include powerful graphics editors to improve the user interface and to transform software development into a visual process. With the use of workstations, PCs, local area networks and PC-based tools, for the first time, the software developer can work from a highly responsive, dedicated development environment. Examples of CAP tools are diagramming tools, screen and report painters, code generators, documentation generators and restructuring and reverse-engineering tools.

Original CAP concepts and products focused solely on creating new applications systems. An important new capability of a CAP tool is the ability to revise the existing applications quickly as new requirements come from the marketplace. New CAP products will expand to include the maintenance, enhancement and migration of existing applications systems, represented by over 75 billion lines of COBOL code residing in IMB production systems alone.

Reverse engineering enables users to extract business rules from old applications and use them as the basis for refurbishing and maintaining those applications.

Different CAP tools focus on particular aspects of system development and different types of software systems including COBOL, Fortran, C, Ada and embedded applications. CAP promotes new techniques like information engineering and rapid prototyping, as well

FIGURE I



as supports traditional structured techniques practical to use by automating structured diagramming and documentation production.

In order to make any use of CAP products, the user must be familiar with diagramming methodologies and programming concepts.

CASE Tools For CAP

CAP (OR CASE) TOOLS CAN be as simple as a few diskettes and a manual or two. One example is AnaTool, ($925) from Abvent (Beverly Hills, CA) that runs on the Apple Macintosh. AnaTool models and analyzes a system's information flow during its design phase. The package links design specifications to the data flows feeding into a program, prints out the specifications and diagrams the data flow.

On the other hand, the EPOS environment from Software Products and Services Inc. (New York, NY) controls an entire development project from start to finish. Running on workstations and mainframe computers, its code ranges from software that defines system requirements to modules that let programmers maintain unfamiliar software long after it is coded. EPOS costs from $8,500 to more than $85,000, and most users are in the aerospace, defense and engineering fields.

Some makers now offer a wide range of tools that work with each other; other companies promise to tie together different makers' CAP tools. For instance, the Software Backplane, an integrated project support environment from Atherton Technology (Sunnyvale, CA) automates many control and coordination functions: tracking a program's version to make sure that only the latest gets modified and tested; cross-referencing code modules, so each programmer uses the same data definitions and variable names; and providing a consistent interface for programmers.

Other tools integrate the efforts of an entire development team, from analysis and module designers to programmers and test-data designers.

Here we have several other examples of CAP (or CASE) products: Netron/CAP (Netron), BracketsPlus (Optima), ProKit*Workbench (McDonnell Douglas IS Group), Exsys (Exsys), RTAda/680X0 (Ready Systems), IntelaGen (On-Line Software Int'l), Teamwork (Cadre Technologies), IEF (Texas Instruments), ADS (Aion), Excelerator (Index Technology) CASE*Method (Oracle).

What many users want is to develop new applications simply by entering specifications into a CAP tool. Push-button code generators, however, will wait until CAP tools can be integrated more fully. In the meantime, CAP has a valuable role to play in the maintenance part of the software life cycle, which may command up to 80 percent of the computer department's assets. CAP code is easier to maintain. It forces the analyst to do a better job at structured design. The resulting code is of much higher quality. The code quality is the main by-product of CAP implementation.

The ability to leverage the investment made in existing applications is another important feature of a CAP product. Converting old software to meet new specifications through reverse engineering is preferable to designing new software. CAP promises to have the same effect on the data center as CIM recently has come to have on the factory floor. Similar to factory automation, we soon will be in the midst of software automation.

Productivity tools such as design analyzers, program generators, reverse engineering packages and data dictionaries are among the products grouped under the CAP umbrella.

Most CAP tools find their roots in structured design methodologies. Structured development delivers quality systems quicker and less expensively than traditional approaches. Standardization and automation of development activities enable HP users to respond faster to changing business needs. A common development methodology yields a better system. The pace and continuity of development efforts are ensured through a common development approach.

The objective of any good CAP product is to replace the templates with automated toolsets that introduce rigor and precision in systems development.

A CAP tool should possess the following:

- *An encyclopedia that facilitates cross-project sharing and centralized management of designs.*
- *A transfer link to the DBMS data dictionary that reduces the work associated with populating it.*
- *A strong diagramming capability that helps to represent pictorially user requirements to enhance communication.*
- *An interface to commercially-available code and design generators enabling easy and accurate code generation.*

HEWLETT-PACKARD HAS SOME good products in the distributed database-networking field, which is very important for the OLTP market; I'm talking about the NetDelivery products. But the competition is getting very strong, especially from DEC.

DEC introduced a distributed transaction-processing software system called DECtp. Among the DECtp products is a software package that will let DEC equipment link with an IBM database.

The new version of VAX Data Distributor software is a serious challenge, in the distributed database-networking field, for Hewlett-Packard. Version 2 Data Distributor looks quite similar to Hewlett-Packard's NetDelivery products.

HP should approach the OLTP and CAP marketplace like they did with the UNIX one. For the UNIX marketplace Hewlett-Packard and SAS Institute are taking a tag-team approach, offering a no loose-ends package.

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Of the HP systems offered, three are single-user (models 319C+, 350CH and 835CHX) and one, the 835S, is a multiuser system. Prices range from $25,000 to over $80,000 for the single-user systems, while the 835S is listed at $68,000.

HP has a new and promising communications-rich operating environment, called NewWave, which could be very useful for OLTP and CAP. HP's NewWave is a software-application environment that incorporates object-management technology and artificial intelligence, as well as the graphical user interface.

The object-management facility is intended to let users transfer small amounts of data, such as a spreadsheet cell or a slice of a pie chart, from one applications program to another, easily and quickly.

NewWave allows this object sharing to take place on a network. It also provides instant updating of all the files on a system that use data from a basic application file. If the data in a spreadsheet were updated a pie chart in a report using that data also would be updated automatically.

By implementing artificial intelligence, NewWave also has an agent capability where users can instruct the system to carry out a number of tasks automatically, such as calling a remote database regularly, gathering data and updating all the relevant files on the user's system.

The NewWave developer's kit is available now for $895. The end-user version of NewWave will be available later this year.

CAP And AI

AN EXPERT SYSTEM incorporated into a CAP tool can provide assistance by telling the programmer what information is missing and filling it in as the user makes it available.

Experience teaches that top-down development does not progress as neatly as the theory predicts.

The maintenance, enhancement and migration of existing applications systems is the objective of the next generation of CAP products. They will open the door to a more reflective, cooperative mode of development, combining forward and reverse engineering. A good CAP product should take care of all four levels of programming: requirements, specifications, implementation and operation.

The four basic CAP activities are maintenance, enhancement, new development and migration. They use some or all of the six development steps: capture and generate source code, reverse engineering, enhancement/validation, forward engineering and design/optimization.

Some steps, known in the expert systems world as problems of incomplete information, cannot be automated fully because of a lack of information.

The new generation of CAP re-engineering products will incorporate expert systems to check details and carry out routine tasks. Reverse engineering means taking existing programs and raising their design objects from the implementation level to the specification level of design.

A reverse engineering product built as an expert system can work interactively with the user to identify the missing

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information, determine its nature, propose alternatives and insert the user's choice where required to complete the process.

Reoptimization is a complex intellectual task and can be assisted greatly by the use of an expert system built into the forward engineering facility.

An expert system also can assist greatly in validating proposed definitions by checking them against a knowledge base of existing designs and looking for similar patterns. From that base, it can suggest missing elements and consolidations that have proven to be useful in other circumstances.

Further, the expert system can check the information flows to see that each piece of information is received from some source at the boundary of the applications system, or is being created within the application.

The expert system for design/optimization uses quantitative information concerning the amount of information to be stored, the access frequencies that will affect the stored information and the response times acceptable for each type of business transaction.

The duplicate storage strategy is one that can be recommended by the expert system, but it requires careful scrutiny by the user as the storage strategy of redundant data consumes more storage space and requires additional processor time in the update mode.

The expert system also offers an important documentation system, which records both its design decisions and the explanations for them. The goal of CAP is that a human designer merely should specify what a software program is to do; CAP tools will figure out how it should function and write the program.

CAP tools will enhance productivity substantially because they are much more than code generators. Let's not forget, however, that they'll make you fast, but they won't make you right.

If we take into consideration the significant growth of CAP in the last few years, and especially the proliferation of CAP, it appears quite clear that CAP represents software development in the 1990s. CAP tools eventually will take specifications and generate Cobol code to write report programs.

Companies who generate large volumes of code don't have a choice but to implement CAP tools for development and maintenance.

The most successful companies will be those that have laid a foundation based on a common methodology and found CAP tools that enhance the systems development and maintenance process. — *Dr. Michael M. Dediu is president of Dediu Computer Consultants, Tewsbury, MA.*

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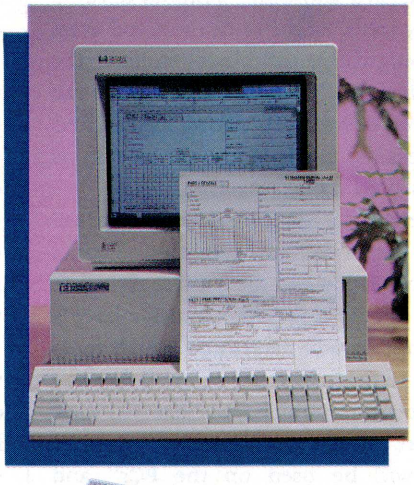

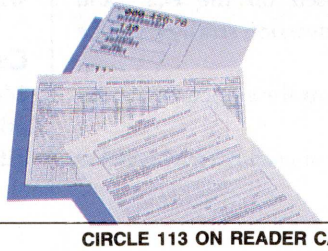

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TRANSFERRING DOCUMENTS

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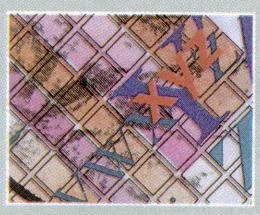

SOFTWARE

Mark Sampson and Sandy Atwell

The ease of use of today's computers has been compared to that of a Model T Ford. If that is a good analogy then the present state of connectivity between computers is comparable to the primitive condition of roads in 1920 — but improving fast.

Many HP Word/3000 users are switching to PC-based word processors. They are motivated by Hewlett-Packard's decision to discontinue support of HP Word/3000 and by features found with PC word processing. If these users have a large number of documents on the HP 3000 computer, then transferring documents between the HP 3000 and a PC is obviously an important consideration.

This article explores the problems encountered in transferring HP Word/3000 documents to and from PCs and some of the tools and methods available. New tools are being developed at a furious pace as both Hewlett-Packard and other vendors develop connectivity tools. At the same time, end users are developing clever techniques to make the current tools more "friendly." Documents can be transferred between HP Word/3000 and PC word processors, but it is not yet as easy as any of us would like.

Transferring a document between HP Word/3000 and a PC involves two distinct tasks: file conversion and file transfer. Whether or not the people doing the transfer have a colon prompt (:) will determine which tools can be used to perform these tasks. Other key questions determine which tools you will want to use. These questions include: "What word processor will be used on the PC?" and "Which document conversion strategy will be used?".

Three main options for a document conversion strategy are:

- *Convert all documents at once in a total switch to PC word processing.*
- *Convert documents as needed in a total switch to PC word processing.*
- *Do word processing on both the HP 3000 and PCs, so there will be a continuing need to transfer documents in either direction as needed.*

If all documents are converted at once, then batch techniques can be developed to make the process more efficient. This probably will involve assistance from data processing or the information center. We developed a batch technique that uses MPEX to make a list of HP Word/3000 documents. We then edited this list into a Reflection command file, which downloaded each document in turn without human intervention. At its simplest this command file is the word "receive" and each document name on a separate line and the word "stop" on the final line. A batch approach allows an organization to convert and download documents with a single copy of Reflection or AdvanceLink, which is certainly the least costly approach.

If documents are converted and transferred as needed, then the end user or data processing could use tools such as those described in *Figure 1* and *Figure 2*. These are not complete procedures, but just the steps required. The processes are not too difficult for even unsophisticated users, but they involve a number of steps that must be followed in a precise sequence.

There are tools available that let you convert the documents and transfer them as two distinct and separate steps and tools that will let you do both as one continuous process. We will discuss several of these tools.

Converting Documents

Most word processors will not read each other's files because each word processor uses different control characters to identify text

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enhancements, such as underlining and boldface. One solution is a utility program that converts directly between two word processors. Also, some word processors can convert each other's documents. For example, WordPerfect and OfficeWriter both can convert to and from WordStar and MultiMate document formats.

Converting documents to or from HP Word/3000 is more difficult than some other word processors because most other word processors and conversion programs do not convert directly to and from HP Word/3000. Two that can are HP Word/PC and AdvanceWrite. The utility program "PCWDCONV", usually in the "PUB.SYS" account, converts files from HP Word/3000 to HP Word/PC format. You can activate a program in HP Desk that will convert files from HP Word/3000 to HP Word/PC or AdvanceWrite by entering "CONVERT" in the work area.

Another approach is to convert a document from one word processor to ASCII (text only) and then from ASCII to a second word processor. This process strips away the special characters that identify enhancements and reduces the document to a "lowest common denominator," which is the ASCII characters. Converting to DCA (Document Content Architecture) instead of ASCII as the in-between step will preserve underlining, bold, indentation and most enhancements. DCA and ASCII have emerged as the two "standard" formats in document conversion, and most major word processors will convert to and from them.

You can convert an ASCII text document to an HP Word/3000 document from within HP Word/3000 using the function keys. To convert from HP Word/3000 to ASCII you must use "Word Util," which "keeps" the document as an ASCII file. Word Util requires a colon prompt, something end users may not have. HP recently has introduced a product called HPConvert/DCA (product number HP27509A) that, when it is added to HP Desk, will convert between HP Word/3000 and DCA.

You can convert an ASCII text document to an HP Word/3000 document from within HP Word/3000 using the function keys.

If you convert the document from HP Word/3000 to DCA or ASCII, you then need to convert the document to the PC word processor's format. Almost all PC word processors will convert to and from ASCII, and most major ones will convert to and from DCA. Those that convert to and from DCA include AdvanceWrite, Samna, Executive MemoMaker, Microsoft Word, WordPerfect and OfficeWriter.

Transferring Documents

The main tools for transferring documents (files) between the HP 3000 and a PC are Reflection by Walker Richer & Quinn and AdvanceLink by Hewlett-Packard. Both of these require a colon prompt, or some clever systems work to allow the user on the PC to start the host portion of the transfer program. Both are fairly easy to use, especially for moving files from the HP 3000.

If the people doing the file transfer

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Walker, Richer & Quinn
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MPEX/3000, Security/3000
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. . . Desk Direct is based on PCSEND/PCRECV. . .

do not have the colon prompt, transfer choices include the following:

- *Use Desk Direct or PCSEND/PCRECV (see the following section).*
- *Write (and encrypt) a command file for Reflection or AdvanceLink that will sign the user on to an account with a colon prompt (see "Reflection File Transfer" in the December 1987 issue of* HP Professional*).*
- *Write a COBOL program or a Qedit "use" file for the HP 3000 that uses the Reflection transfer commands (see "Reflection File Transfer" in the December 1987 issue of* HP Professional*).*

One Continuous Process

The easiest tools for an end user are those that convert and transfer documents in one continuous process. Some of these also bypass the need for a colon prompt, so they allow end users to transfer documents in organizations whose security does not allow them ever to have the colon prompt after sign on (such as Security/3000).

The main tools that both convert and transfer documents are:

- *Desk Direct by Walker Richer & Quinn, which also requires HP Desk and Reflection.*
- *PCSEND/PCRECV by the Apex Group, which requires HP Desk and either Reflection or AdvanceLink.*
- *HP Word/PC includes AdvanceLink command files, which convert a document from HP Word/3000 format to HP Word/PC format and transfers it to the PC, and vice versa. This requires AdvanceLink, and the user must have a colon prompt.*

According to Jay Swearington of the Apex Group, Desk Direct is based on PCSEND/PCRECV with several features added following an agreement between the Apex Group and Walker Richer & Quinn. The Apex Group continues to market versions of the original PCSEND/PCRECV that work with either Reflection or AdvanceLink.

The tools that convert and transfer files in one process are especially suitable for end users to convert and transfer several files one at a time as needed. Two of these are illustrated in *Figure 1* and *Figure 2*. Desk Direct and PCSEND/PCRECV (*Figure 1*) do not require a colon prompt, while the AdvanceLink command file in *Figure 2* does.

On the other hand, if an information center or DP personnel will be converting a large number of files at a time for the end users then other tools may be more cost effective. A single copy of AdvanceLink or Reflection can be used, and the transfers can be set up as batch jobs by using command files. — *Mark Sampson is PC coordinator and Sandy Atwell is training administrator at Gould Inc., Glen Burnie, Maryland.*

FIGURE 1

File Transfer Using PCSEND/PCRECV or Desk Direct

These are the steps required for an end user to convert a group of HP Word/3000 documents to ASCII or DCA format and transfer them to a PC using PCSEND/PCRECV. This should serve to illustrate the relative complexity of one of the best approaches. For Desk Direct, substitute "RRECV" for "PCRECV". A colon prompt is not required.

1. Run Reflection (or AdvanceLink) on your PC.
2. After it loads, sign on to the host HP 3000 as usual.
3. Select HP Desk.
4. Copy each document into HP Desk with "COPY FROM (file name)".
5. Convert each document to the appropriate form with the "CONVERT" command.
6. Enter "PCRECV" (or "RRECV") to begin the transfer for each document. (When transferring to the PC it is not necessary to identify the document type. If transferring to the HP 3000 the document type must be identified.)
7. Exit HP Desk.
8. Sign off the HP 3000.
9. Exit Reflection (or AdvanceLink).
10. Convert the documents to your word processor's format, if necessary.

FIGURE 2

File Transfer/Conversion Using HP Word/PC

These are the steps required to transfer a group of HP Word/3000 documents to the PC using the AdvanceLink command file that comes with HP Word/PC. The conversion from HP Word/3000 to HP Word/PC is done automatically. A colon prompt is required.

1. Run AdvanceLink on your PC.
2. After it loads, sign on to the host HP 3000 as usual.
3. Exit AdvanceLink.
4. Run "3000 => Word PC".
5. Enter the "to" and "from" file names.
6. Exit "3000 => Word PC".
7. Run AdvanceLink.
8. Sign off the HP 3000.
9. Exit AdvanceLink.

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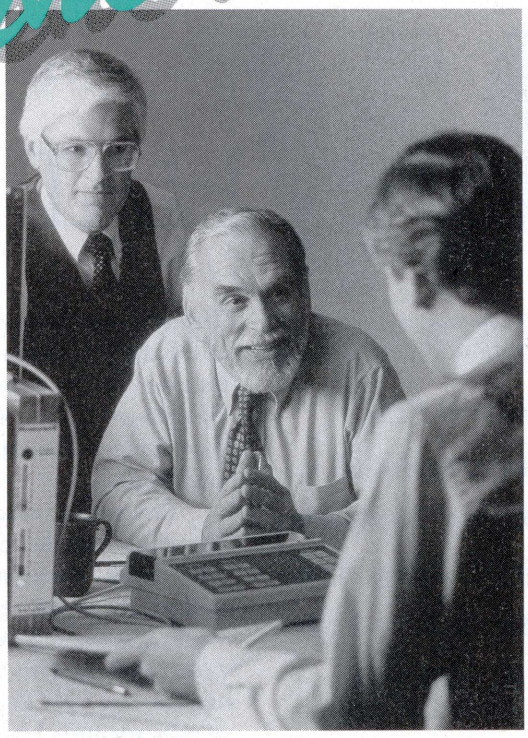

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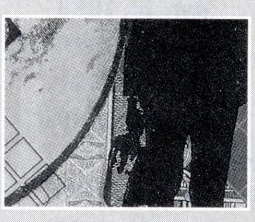
WHAT IS CASE?

Where Is The Computer-Aided Software Engineering Market Going And What Is HP's Place In It? Part 4



CASE

Peggy King

The front-end portions (requirements analysis and design) of integrated CASE products are far more similar than the tools for the back-end phases of the software lifecycle (coding, debugging, maintaining, testing and reverse engineering).

Last month's article focused on four vendors with integrated products that run on HP 9000 Series workstations: Hewlett-Packard (selling a licensed version of Cadre's Teamwork), Interactive Development Environments (IDE), Meta Systems and Software Products and Services (SPS). Since the front-end features of most products have comparable capabilities, it was possible to isolate each front-end function and to do a vendor-by-vendor comparison of the tools.

When it comes to examining the back-end features of integrated products, the management tools that each vendor provides and the project database, the picture gets far more complicated. Among the vendors, I found differences in the target markets, the intended users and the extent to which other tools could be integrated, not to mention the technical differences among the products.

Programming Tools

Each of the vendors targets a slightly different segment of the CASE market, and therefore, the customers need different tools for coding, debugging, testing and maintenance. In projects or environments with many lines of existing code written without the aid of structured analysis and design, reverse engineering is an important capability, but only SPS' EPOS has been used in an extensive project for recapturing the system design from source code. As the other vendors plan product enhancements, reverse engineering capabilities are high on the lists.

Hewlett-Packard/Cadre

The Logic Systems Division of Hewlett-Packard began using Cadre's Teamwork internally for development of embedded systems.

Consequently, most of HP's enhancements to Teamwork and the compatible tools HP has developed are for the microprocessor development environment and the telecommunications market.

Earlier this year Cadre released Teamwork/IPSE__toolkit, an enhanced version of its Teamwork/ACCESS product, that integrates programming tools and a project database. The ACCESS portion of the product contains a fully supported and maintained C-language library. The product also includes "contributed software," samples of ACCESS programs. Although HP distributes this software to HP Teamwork customers, support is not provided. The HP version of the Teamwork/IPSE__toolkit will be available this fall.

One sample of Teamwork's code generation capabilities are in the form of contributed software. The HP Teamwork/ACCESS module of Teamwork's IPSE__toolkit has been used with C-language programs to "walk down" through a structure chart created in HP Teamwork/SD and create code frames. When software modules have been defined, they can be extracted from the Teamwork ACCESS database for code generation.

Among the software development tools that HP markets for use with HP Teamwork are cross compilers, HP 64000-UX (a softkey-driven editor), debuggers, simulators and the recently announced Basis Branch Analyzer

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(BBA), a tool to analyze the results of test cases. When code is run through BBA's preprocessor, it "instruments" the program by putting in flags where the code branches. These flags allow programmers to know how much of the code a test actually covered.

Interactive Development Environments

IDE sells Software through Pictures to a broad range of businesses including universities, telecommunications companies and government agencies as well as aerospace and defense companies.

Software through Pictures supports the generation of declarations for C, Ada and Pascal through the Data Structure Editor. Structured Query Language (SQL) database schemas for Ingres, Oracle, Informix and other relational Database Management Systems can be generated from the Entity-Relationship Editor.

Release 4.0 of Software through Pictures, available this fall, includes a rudimentary form of reverse engineering, the capability of taking strings of characters in Bakus-Naur Forms (BNF descriptions) and generating data structure diagrams from these forms. BNF data descriptions are a notation for specifying data definitions.

IDE's open architecture policy means that all interfaces for Software through Pictures are published. Therefore, software developers can create programming tools that can be integrated through the central project database.

Meta Systems

Meta Systems' customers are primarily government agencies and defense contractors. Some of its users have projects involving Management Information Systems rather than technical environments.

The RSI (Report Specification Interface) can act as a bridge to other third-party tools, such as simulation software used to debug real-time systems. RSI can be used as a rules processor to do consistency and completeness checking. It also is possible to use the PSA database for performing quality assurance checks.

Code generation capabilities of PSL/PSA come from tools outside Meta Systems' environment. Customers have used PSL/PSA as an open-ended tool to build "bridges" to code generators, but none of these applications is supported by Meta Systems.

The current reverse engineering capabilities of PSL/PSA are limited. PSA can scan the code and translate certain useable portions to PSL, but it does not restructure code in accordance with requirements.

Software Products And Services

SPS has over 400 installations in the U.S. and western Europe. Customers include government agencies defense contractors, telecommunications companies and manufacturers. Many of the EPOS systems were installed for projects involving real-time imbedded systems. The HP 9000 version of EPOS became available in mid-July 1988.

Beginning with the version of EPOS that SPS is shipping this fall, it is possible to generate code in C. Code generation capabilities for Ada, FORTRAN and Pascal have been part of EPOS for over a year. The most advanced code generation capabilities are available through the EPOS Ada Composer that generates complete Ada packages or subprograms from formal design specifications created in the EPOS-S module.

Reverse Engineering is a distinguishing feature of the EPOS software engineering environment. Projects have been undertaken to recapture requirements and design specifications on large avionics projects. A recent project with NASA has led to the development of a more systematic reverse engineering methodology and the identification of tools needed to automate further the reverse engineering process. In the NASA example, a 20,000 line FORTRAN program was reverse engineered. The process revealed coding errors, inconsistencies and missing segments of documentation. The regenerated code functionally was equivalent to the original.

Configuration management, project management and documentation management are the principle types of management tools included in an integrated project environment.

Management Tools

Configuration management, project management and documentation management are the principal types of management tools included in an integrated project environment. All of the vendors except Meta Systems have some form of each of these three categories of tools available in their environment. In some instances, these management tools are part of a newly released or soon-to-be released version of the product.

Hewlett-Packard/Cadre

Project Management — Teamwork includes built-in status labels to tell who and when modules were created and modified. The ACCESS portion of the HP Teamwork/IPSE toolkit allows extraction of project status information for use in project status reporting.

Configuration Management — Although it is possible to use the UNIX Source Code Control System (SCCS) utility with Teamwork, all modules of HP Teamwork now include the Teamwork MCM (Model Configuration Management) tool. Teamwork MCM allows tracking of changes, freezing of baselines, rollback of unwanted changes, com-

parisons to previous versions and controlled access to models.

Document Processing — The document processing interface (DPI) module of Teamwork now is available with the HP Teamwork/IPSE toolkit. There are integrated interfaces (rather than filters) to document production tools such as Interleaf, Scribe and Frame. DPI directly supports 2167 document requirements and includes templates for 24 common Data Item Descriptions (DIDs). The release 3.0 also has enhanced LaserJet support.

Interactive Development Environments

Project Management — Software through Pictures includes no project management tools of its own, but the Visible Connections open architecture provides an easily accessible interface to these tools.

Configuration Management — IDE's user interface provides a mouse and menu connection between Software through Pictures and a version control system such as SCCS.

Documentation Processing — Release 4.0 of Software through Pictures has a Document Preparation System (DPS) that supports editing, checking and generation of documents. A DPS template language lets users define the structure and content of their document and provides filters to various formatting languages such as TROFF and to document processing systems such as Interleaf. Also, new to Release 4.0 is a DoD-STD-2167 application that provides a set of user-modifiable templates to combine text, graphics and tables into publishable documents.

Graphics and tables can be extracted or created dynamically from the Software through Pictures data dictionary to produce six major types of documents.

Meta Systems

Project Management — The PSA database has a trace key to help maintain project tracking, but there is no integrated project management tool that works with PSL/PSA.

Configuration Management — There are no configuration management tools closely integrated with Meta Systems' product.

Documentation Processing — The QuickDoc feature of PSL/PSA provides 38 standard PSA reports. It can take boilerplate material and insert it into documents using runoff commands. The Report Specification Interface is a high-level language that allows flexibility in retrieving and customizing documents.

Meta Systems also provides several

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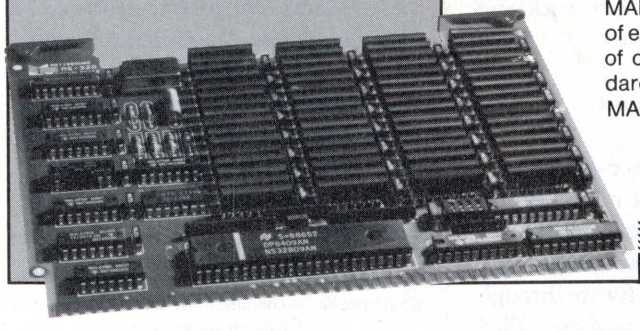

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templates for DoD-STD-2167 reports. These templates use RSI scripts to generate the documents, and the output of these scripts is processed through TROFF for the final version of reports.

Software Products And Services

Project Management — EPOS-P is the project management module of the EPOS system. The project management graphics in this module include responsibility matrices, PERT charts, Gantt charts and critical path analysis. Product management features also are included in EPOS-P.

Configuration Management — The EPOS system has two levels of configuration management capabilities. The EPOS product provides version control. For more full-scale configuration management, Software Products and Services and Softool Corporation (Santa Barbara, CA) recently announced an agreement to integrate Softool's Change and Configuration Control (CCC) product with the EPOS environment. CCC allows users to organize and track all components of an application as a single unit. This tightly integrated option is available in fall 1988.

Documentation Processing — The EPOS Document Generator is a new component of the EPOS system to be introduced in Version 5.0. The Document Generator allows a user to define the layout and format of a document; mix text and graphics; and integrate diagrams, tables and specifications from the EPOS database into a document. Templates will be provided for DoD-STD-2167 reports. If the documentation includes diagrams, the output must be generated on a laser printer, but no specific desktop publishing tool is required. A layout definition feature can define the cover sheet format, headers and footers.

Project Databases

As of fall 1988 all four of these CASE products have a proprietary database. Until the release of Version 3.0, HP Teamwork had used a Unify database for its project database. Since all of the products now have proprietary databases, the major difference between the types of databases is a philosophical rather than technical issue: Can the database schema of the project repository be modified by users? Another issue is the level of integration with third-party tools.

Hewlett-Packard/Cadre

HP and Cadre believe that a schema that is closed to modification by users is beneficial to customers because it is possible to offer better support when all users have the same version of a system.

The ACCESS tool in the HP Teamwork/IPSE toolkit opens the project database so that front-end Teamwork tools can be integrated with back-end tools outside of Teamwork.

Interactive Development Environments

IDE believes in a user-modifiable database schema so that customers do not have to wait to make changes until the vendor makes the same changes. The project repository for Software through Pictures is a relational database called Troll/USE.

IDE founder Tony Wasserman has long been a proponent of cooperation among CASE vendors. Open architecture allows for complete integration of tools from other vendors since all interfaces are published and all files that produce messages are visible and modifiable.

Meta Systems

Although the schema for this database is closed to users, it is possible to use Report Specification Interface (RSI), a high-level language that is a subset of PSA, as a bridge out of the database to other applications.

There are commercially available interfaces from PSA to Accelerator from Index Technologies and Design Aid from Nastec.

Software Products And Services

SPS publishes a definition of its schema to allow users open access. The database is relational and has optimizations for hierarchical access.

The latest release of EPOS includes an ACCESS layer that makes it easier to integrate other tools. This tool is a library of database access routines that can link to output formatting (ASCII, PostScript, etc.) specifications and the invocation of other tools. With the high level of integration in this release, a user need not leave EPOS to invoke other tools.

This article concludes a four-part survey of CASE tools that focused on products for workstations. Because of the focus on HP 9000 workstation products, several types of CASE tools were not covered. MS-DOS based CASE products were not reviewed even though these vendors have products that run on microcomputers. The focus on products for technical environments also precluded descriptions of products for data processing and management information system (DP/MIS) environments. — *Peggy King is HP Professional's West Coast editor.*

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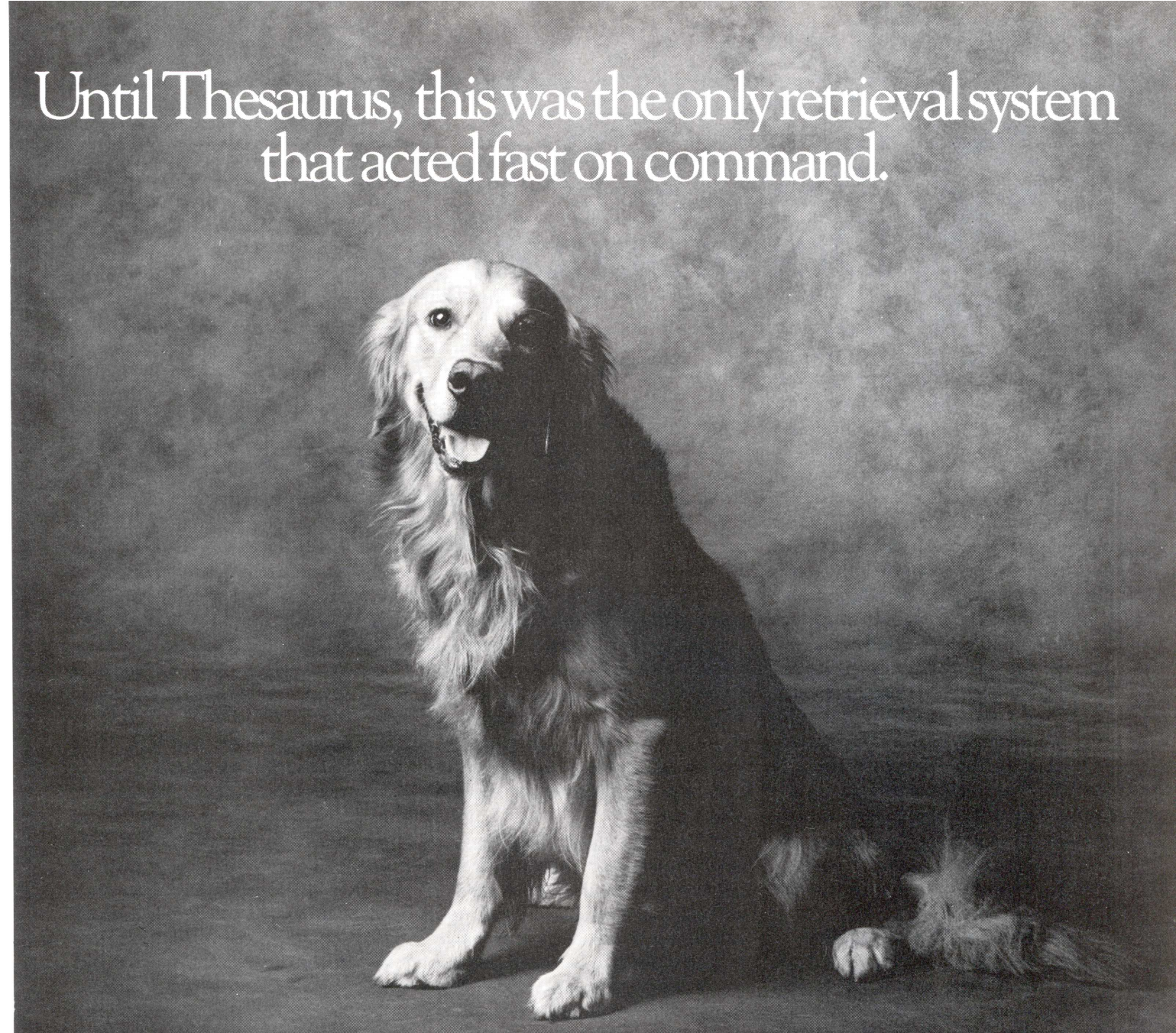

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DESKTOP PUBLISHING

Ashley Grayson

Understanding The Requirements Of Technical Literature

Writing Better Documentation

Nobody sets out to produce poor quality documentation. Yet much of the material delivered with computer programs, and hardware, too, isn't very effective. Frequently the cause can be traced to inadequate recognition by management of the need to do it right, and no funds are allocated. Often a lack of understanding of how documentation is developed is to blame. The material is often inappropriate, inadequate, incomplete or unfinished. For example, a manual that contains examples that do not display an understanding of how users will apply the product is inappropriate. Literature supporting a program that does not include a tutorial or basic "how to" information is inadequate. Not listing all the error messages leaves documentation incomplete. A literature package that lacks an index or other key into the material is unfinished.

Far too much technical prose is static, lacking the sensory impact that creates the feeling of relevance to the reader's interests.

Understanding What's Required

Key to overcoming all these difficulties is understanding the writing and editing requirements of technical literature. Computer documentation involves three distinct types of writing: investigative journalism, clear exposition of concepts and precise description of procedure. Not every writer possesses all these skills, but unless they are brought to bear on a document, it will fall short of delivering the understanding the user needs to apply the product successfully. A program that requires five or six people and a year to develop can't be given to a single writer to document in six weeks.

Equal in importance to the writing skills brought to a project are the editorial requirements. These include setting goals, maintaining focus and pre-production project management of the document. This latter catch-all includes insuring that the writer(s) deliver consistent tone and voice in the prose, maintain style in the document and oversee fact checking and testing. Yes, computer documentation must be tested, too.

Only after these critical issues of the documentation process have been addressed can the actual production cycle begin: the final proofreading, typesetting and layout that lead to printed materials. Desktop publishing is a preproduction technique that has been sold universally as a miracle method enabling the user to leap directly from the need for documentation to the finished product. It can, in fact, improve productivity at almost every step, but only if properly applied. Anyone not getting a benefit from desktop publishing tools and techniques is a victim of poor documentation of desktop publishing itself. Either the cost savings have been mis-represented as a substitute for planning, or the DTP process was offered as a replacement for the talents of writers and editors.

If desktop publishing won't solve the documentation dilemma, what will? The answer, of course, is a clearer understanding of the nature of documentation. By careful planning — asking the right questions, then answering them — documentation can become a full contributor to computer systems.

An Analogy: Over The Hill And Through The Woods

If this were an all-too-typical example of technical documentation we would now itemize, in the order they've been introduced, all of the concepts discussed in the first few paragraphs, drop into a narration of a procedure or begin a long tutorial. Instead, we will draw an analogy that will help position the concepts and procedures in light of the goals.

Developing documentation that serves the user, and there is no other purpose for documentation, is like driving a five-year-old to grandmother's house. Consider the experience of tossing a kid in the back of a car for a six- or seven-hour auto trip. Any parent will verify that some advance preparation is required. Seen from the other side, sitting in the back seat of a car is equivalent to the experience of working with a new software or hardware product for the first time. The youngster (read "user") will be confined to a small physical space and be subjected to twists and turns over which he has no control. The isolation

of the child from his playmates (read "co-workers"), familiar toys (software he's comfortable with) matches the documentation dilemma nicely.

Except in the case of 100 percent clone products, the user is breaking new ground. No other human activity is as unfamiliar as working with a new piece of software. And the reader is alone; no printed or on-line documentation has ever been developed for group reading. Because reading is done in seclusion, the document must carry the entire burden of holding interest and responding to the reader's need for involvement. Just as the child's trip will be more endurable if the goal is understood clearly and the benefits of arriving are explained, the reader of the document must be accommodated. The scenery that flashes past may be interesting, but, without a sense of context, it quickly will lose appeal.

Without guidance, hands-on activities and relevance, the reader will burn up valuable dollars on the customer-support line just as the child will repeatedly climb over the back seat to ask "Are we there yet?" This is the best of a bad situation. The really dissatisfied child can cry or throw up. The really dissatisfied user can kill further sales by negative word of mouth. The auto trip includes one additional element that must be crafted deliberately into documentation — a sense of forward motion. Far too much technical prose is static, lacking the sensory impact that creates the feeling of relevance to the reader's interests.

Introductory Material

In motion picture terms, the image that positions the drama that will unfold is called an "establishing shot." Good technical literature needs to open the same way — with a concise statement in words and pictures of what the program, or computer system about to be discussed, will do. This concept often is abused in material developed by educational technologists and devolves into nattering about the process of learning about the subject. Better to get to the point.

Focus

Another common shortcoming of computer documentation is improper focus. Much technical prose is built outwards from the product, itemizing each command and switch, but never placing them in context of use. "Switch A should be set up (open) for one wait state, or down (closed) for zero wait states." This is precise, but its acceptability as documentation is limited by its assumptions about the reader's level of comprehension. The words "on, off; enabled, disabled; 0,1" can be substituted freely for "up, down; open, closed" and still cause the same amount of confusion for the reader. Clarity comes from understanding the implications of each choice. A good user manual should develop from a clear understanding of what the user will want to do. It should be goal-oriented.

The reference manual can be prod-

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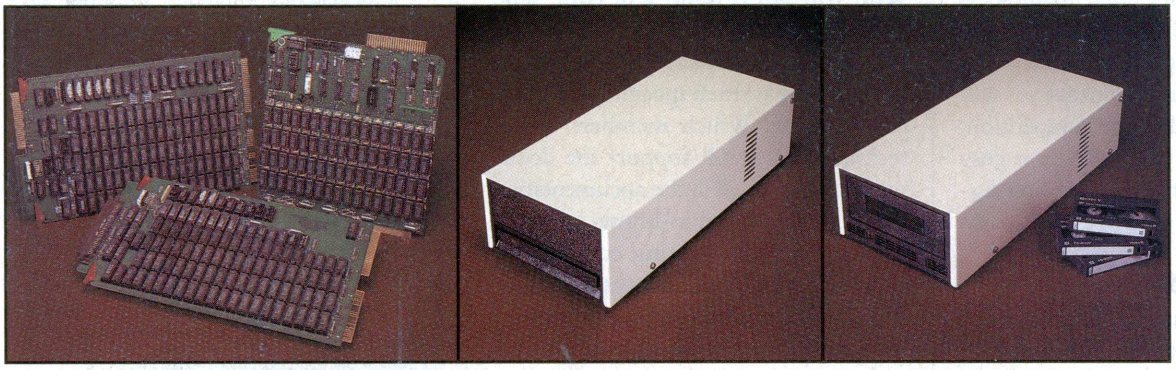

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. . . they are dooming their customers to wasted effort . . .

uct focused. If the manual is organized with the same structure as the program, it will be as bewildering as the program. Basic UNIX documentation always has had the difficulty that you can't look up anything unless you know what you are looking for. Considered from this perspective, it is clear that providing a paragraph that describes what each menu item does is not a sufficient explanation of a menu-driven program. An alternate focus that cuts diagonally across the program structure can teach the user how to find answers without itemizing them all.

Error Conditions

Documentation often omits any consideration that the user may encounter an error. In some cases such material is removed specifically by order of the sales and marketing department under the irrational fear that any negatives will kill a sale or be used by the competition. In reality, they are dooming their customers to wasted effort and adding significantly to their own support costs.

Writing Standards

An often abused aspect of good documentation is standards. Adherence to writing standards is wonderful. Standards provide a measure of performance, tell us when we're done and keep us from overlooking the obvious. A blind and unyielding adherence to standards, regardless of situation, becomes a straightjacket that ties the hands of the writers who are attempting to convey the essence of an innovative piece of software. Documentation should serve the user by delivering the most accessible introduction to and reference for the system being described.

Conventions that do not develop directly out of the system and application being documented should be applied cautiously. Page format and typographical conventions required by a drawing program are dramatically different than those for a spreadsheet pop-up.

Here is a simplified project plan for successfully documenting any computer program.

1. Identify the target user of the Program.
The needs of the user will drive the form and quality of the material developed. Even operating system utilities have users: the other system programs.

2. Determine if the program will have an administrator and/or operator as well as a user.
Data base programs, for example, may need to be administered as well as used. Operators execute policies specified by administrators for the benefit of users. Each of the three groups (administrator, operator, user) requires a different presentation of the material.

3. Identify the team that will develop the documentation.
Who will write? Who will edit? Who will test? What resources will the development team utilize to complete the project? Any written specification, project plan, etc. Which members of the technical team will support the documentation team. Will the documentation group be assembled in-house, provided by a professional writing company or supplemented by consultants?

4. Give the documentation development team time to do the job right.

5. Supplement the documentation project with outside resources, such as design and illustration, where appropriate.
The design of any document should derive from the content. Pages should be designed in a cooperative effort with the editor, not given to an artist or paste-up person to be decorated. Use of multi-column layouts, hanging indents and choice of graphics should be driven by the requirements of the subject matter, not pure aesthetics. Color should enhance the content, not decorate the page.

Page design and layout issues can affect printing costs dramatically. Odd sized pages, or those with unusual height-to-width ratios, may be expensive to print. They may be justified by the needs of the product, but should be planned for. Waiting until printing bids are solicited is too late to discover that the budget cannot cover the printing of a camera-ready document.

6. Test the materials on representative naive users. If they have trouble, look for omissions of key concepts in the documentation, rather than assume the testers are stupid.

7. Review and edit the document for flow and consistency.
Flow is what gives a document the sense of motion referred to earlier in the analogy of the child's auto trip. If the exposition doesn't seem to be going anywhere, the reader will lose interest. The flow in documentation should be driven by the reader's needs rather than by the totality of all the technical staff might want to say on a subject. This is where the documentation group must choose between including information in the user's manuals or placing it in the reference manual.

Consistency includes speaking to the reader in a uniform voice and maintaining a consistent structure of information about the product. A manual that

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jumps between addressing a single reader as "you" and "the user" is not consistent in voice. Note, however, that an operator's manual legitimately can address the operator as "you" and the user as "the user" because the reader is the operator.

Another type of inconsistency found in technical manuals is the intrusive voice of the developer or even the writer.

"Now before we go into a long discussion of how to exit this program, let me just tell you that Charlene and I wrote this program to do everything the user might want to do. To exit the program is a personal insult to us, so if you don't at least type "bye Charlene", you'll lose your files."

This imaginary paragraph combines many awful examples found in actual product manuals. The word "before" may be flagging a problem in flow. If the user must be alerted to perform some actions before others, the problem may lie in the program design. Usually it denotes an organizational problem in the structure of the manual. Here, it is just part of "nattering to the reader." The writer is talking about the act of documenting the program. "Go into" and "put" are poor word choices at best; here they are used in discussing the reader's act of reading the documentation. "That" is a word that always can be removed by restructuring the sentence. For example: By restructuring the sentence, you can remove uses of "that." Inserting quotations from the developer in the manual may not be a bad idea, but in the above example, it's inappropriate. Addressing the reader as "you" and "the user" in a single sentence is jarring.

The only safe way to exit the program is to type "BYE CHARLENE", but the message is almost lost in the phony attempt to be "user friendly" by adopting a salty style. Talking around the subject instead of about it never helps the user. The closing phrase "you'll lose your files" is incomplete and unclear. "Lose" implies they are present in an unknown location — they might be found in the future. Common computer jargon, however, uses lose to mean destroyed, thus the phrase is unclear. The phrase is also incomplete in not stating whether the current changes will not be saved or if existing files may be deleted.

8. Prepare an index that actually can be used to look things up.

Automatic index generators only itemize occurrences of key words. They need to be used by someone who has sympathy with the product's user to deliver results. The manual for Ventura Publisher from Xerox has a very good index, developed from a real understanding of what the user wants to do with the product and how he thinks. For example, the entries under "Problem" include "Tabs don't work" and "Text can't place where I want."

9. Copyedit the resulting text.

Don't forget to spell check the photo and illustration captions. Artists don't spell well; look carefully at any art containing text or call outs.

10. Then and only then, give it to the printer.

No amount of color press work, tabs and vinyl binders will replace content.

Off To The Printer

Great pricing latitude exists in the industry and comparison shopping can cut costs enormously. Two equally good printers may differ in price on a particular job by over 100 percent. The higher priced printer may not be gouging, but merely busy. One shop's quote for printing may be high because they must work on second shift or at overtime rates, whereas an idle press might quote a lower price.

Matching the job to the printer with the right equipment ultimately falls on the user, but the savings may be worth it. — *Ashley Grayson is the founder of ADG, a market and product analysis organization based in San Pedro, CA.*

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WORKSTATIONS

Bob Youngquist

Putting PCL To Work

When talk turns to laser printers, PostScript compatible printers and desktop publishing applications seem to attract the most attention. Meanwhile HP quietly has been establishing a de facto standard with their LaserJet line of printers.

Certainly, one reason for the LaserJet's acceptance is its aggressive price. Another is its excellent packaging of the generic Canon laser printer engine. But the key to the LaserJet's success has to be HP's Printer Command Language (PCL).

Like HP-GL for plotters, PCL has transcended HP hardware to become an industry standard. The vast majority of general-purpose laser printers boast of "LaserJet emulation," meaning they support PCL.

As the LaserJet II technical reference manual points out, PCL is a multileveled standard for feature access by software applications. In addition to the complete implementation (Level IV), there are three subsets of the language for printers of lesser capabilities. The multitiered approach is designed to smooth the upgrade path as printer capabilities expand. The LaserJet is a Level IV printer.

An All-Purpose Output Device

In the most basic sense the LaserJet is a raster graphics output device. Images, be they text or graphics, are composed of dots. A string of bytes is used to describe a row of dots with each bit representing a single dot. On the lowest level, PCL can be used directly to create these raster images. With this capability the LaserJet can be used as a "quick and dirty monochrome plotter." Many CAD programs (like AutoDesk's AutoCad) support the LaserJet as a 300-dpi plotter. Utility programs also are available to print HP-GL plot files on the LaserJet.

The predominant application for laser printers is, of course, text output. The character shapes or fonts are generated from bit maps, which are stored either in the printer permanently, reside on external font cartridges or can be downloaded temporarily from the host computer.

Level IV PCL provides great flexibility in font control. Its capabilities have been utilized to the fullest by the many desktop publishing programs that have become available in the last two years. PCL's font capabilities are probably one of the key factors in the proliferation of desktop publishing. It has allowed HP to produce a capable, but more economical, alternative to the PostScript-based laser printers like Apple's LaserWriter.

The LaserJet is adept equally at the more mundane output functions required by everyday business applications. Paper handling always has been a troublesome problem for computer printers. PCL makes the LaserJet II an adept paper handler. Its capabilities presage the day when offices will be completely without forms. In fact, for some that day has arrived already. Our LaserJets earn their keep daily by generating all of our business forms, printing and addressing the bulk of our correspondence and promotional literature and producing a variety of adhesive labels used in production.

Forms Creation Using PCL

Extensive page control is one of PCL's most useful capabilities. Page size, orientation (portrait or landscape), margins, paper source and number of copies all are controllable by escape sequences. With a little PCL programming, a LaserJet can simplify significantly the generation of business forms. These forms can incorporate character-graphic line drawings and a mixture of proportional or monospace fonts. This eliminates the need for separate paper sources and expensive multiplebin sheet feeders. It also lends a great deal of flexibility to software.

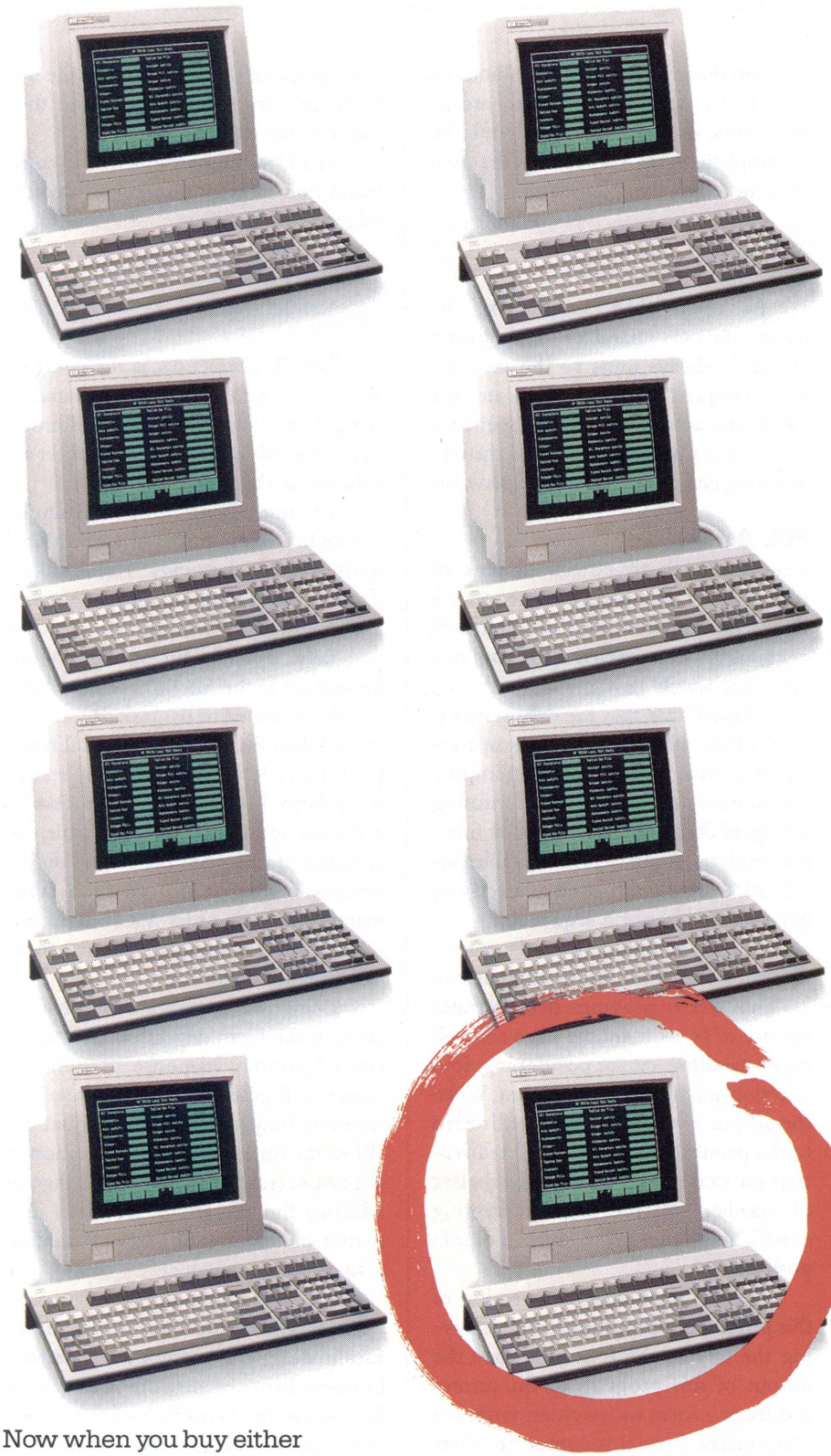
For example, an invoicing program could generate an invoice or a credit memo by choosing a different software form. This eliminates the need for operator intervention other than keeping a single paper tray well stocked. We use just such a system for generating invoices and shipping advices at a remote shipping facility, which is connected by ordinary phone line.

Unlike impact printers that print a line at a time, the LaserJet assembles a bit map of the entire page in memory and then prints the completed page. The procedure for laser printer forms generation is analogous to more traditional methods in that the text contained by the form is printed on top of the form. The difference is that this occurs in the printer's buffer rather than at the physical level.

First, a sequence of characters representing the underlying form (an invoice form for example) is transmitted to the printer, then PCL commands, are used to write the information (invoice items, etc.) over top of the form.

PCL Syntax

There are three fundamental types of PCL commands: control codes, two-character escape sequences and parameterized escape sequences. CR and FF (ASCII 13 and ASCII 12) are examples of



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control codes. They initiate a printer function like carriage return or form feed. Escape sequences can have a different effect. A two-character escape sequence like Esc-E resets the printer to its default characteristics.

Parameterized escape sequences include numeric values or variables. The following sequence positions the cursor to column 10:

```
ESC & a 10 C.
```

In the example above ESC represents ASCII 27. It has the general form:

```
ESC & a x C
```

In this example "&" is the parameterized character or the indication that this is a parameterized escape sequence. "a" is the group character, which indicates that the command is from a group of similar commands that can be combined to form more compact sequences. "x" is the column position of the cursor, and "C" is the termination character.

Another escape sequence from this group is:

```
ESC & a 15 R
```

This does row positioning of the cursor (in this case row 15). You could position the printer cursor at column 10, row 15 by sending these two escape sequences, or the same thing could be accomplished by combining the two sequences into the following:

```
ESC & a 10 c 15 R
```

In combining sequences, the parameterized character and group character always must be the same (in this example "&" and "a"). Note that ASCII characters within the sequence always must be lower-case and the terminating character is always upper-case.

PCL Readability

One drawback to PCL is its lack of readability. These simple sequences are clear enough, but more complicated ones must be assembled with care; one typo can wreak havoc.

I have found that the C language is particularly adept at taming escape sequences. Macro definitions can impose mnemonics on otherwise confusing strings of characters, and the print function with its ability to print variables inside of strings lends itself perfectly to parameterized escape sequences.

The code fragment in *Program 1* illustrates the use of escape sequences in C. This trivial program demonstrates the use of PCL for simple page control, paper handling, cursor positioning, font selection and printer initialization. When the output of this program is redirected to the printer (using UNIX I/O redirection for example) the result is a matrix of numbers on the page identifying every line and every fifth column position.

I use a more complete version of this program in designing forms. Copying the text of the form and then the output of this program to the printer results in a form overwritten with x-y coordinates. I use this composite sheet to judge where text should register on the form and define a series of permissible coordinates for the text. These coordinates along with some other attributes go into a form definition file. The form printing program reads this description of the form, copies the underlying form to the printer and then registers the data on top of it.

In a UNIX environment the command line to print a series of invoices might look like this:

```
printforms invoice.dat invoice.frm
invoice.def | lp
```

The file invoice.dat is the contents of the invoices; invoice.frm is the underlying form; invoice.def is the definition of permissible coordinates and other attributes of the form.

The underlying form itself can be a complicated collection of proportional fonts and line drawings. This entails a daunting collection of escape sequences and text if you attempt to create it manually. Fortunately, modern word processors in the MS-DOS environment are ideally suited to the task. Because of its excellent line-drawing capabilities, I use Microsoft Word to create the underlying form. Like most word processors it has the option of printing to a file. Inspection of this print file reveals an indecipherable sequence of PCL commands and high-order ASCII characters responsible for the proportional fonts and line drawing.

Using this system a new form including the form definition file can be created entirely in-house in about 20 minutes. Typesetter and print shop lead times no longer figure in the equation. When the forms require modification in the future (such as to reflect a change of address) the alterations are made in a matter of minutes all without wasting a single sheet of paper.

PCL and the LaserJet have contributed greatly to many applications. Eliminating ugly computer-generated business forms is just one example of how to put this versatile hardware- software duo to work.— *Bob Youngquist is president of Insight Instrument Corp., Fort Erie, Ontario.*

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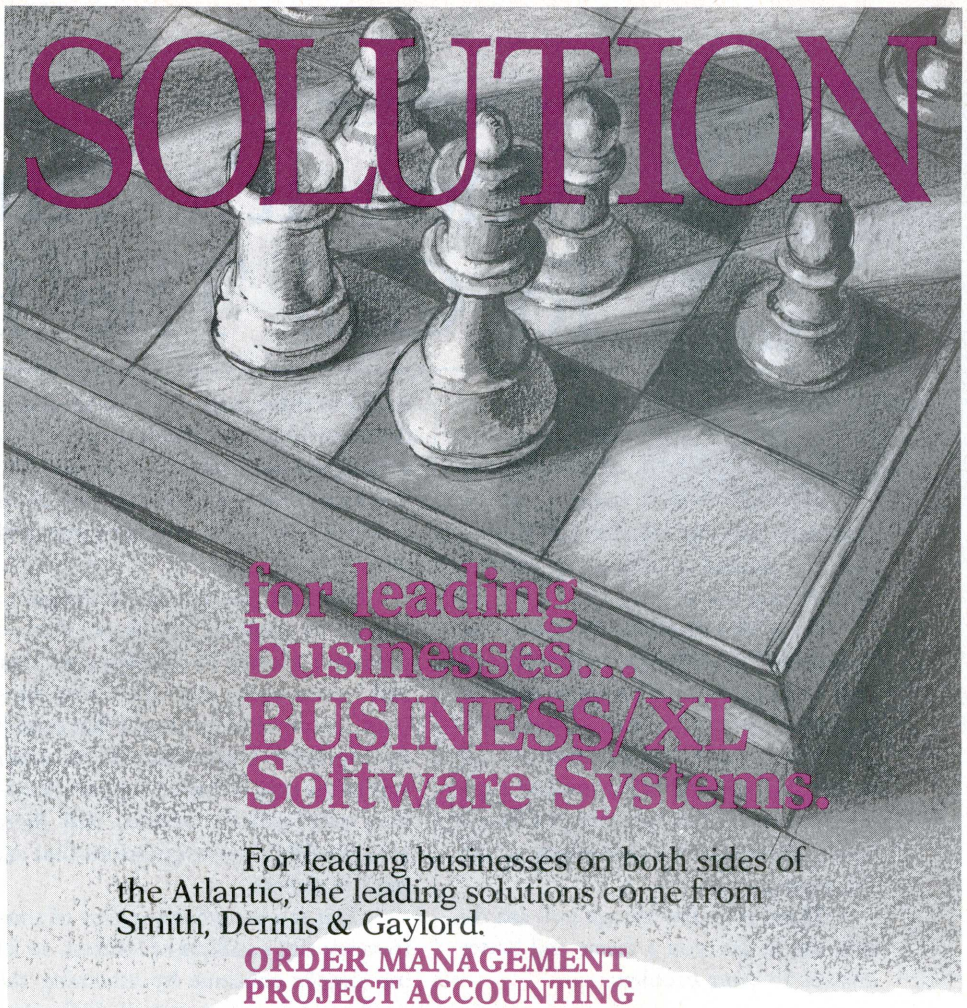

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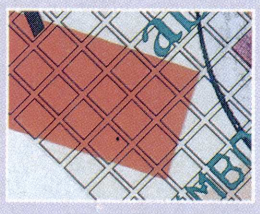
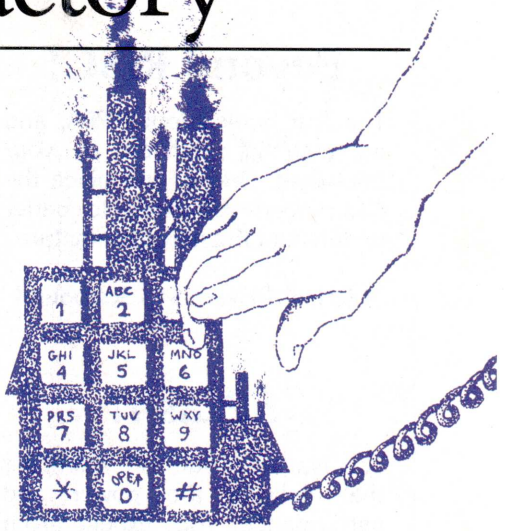


OPINION

Greg Goebel

When It's Time To Call The Factory



I've been an HP support engineer for over three years now, and I've talked to lots of people. I've wanted to help all of them; I have helped many.

If you have an expensive system and are paying big bucks for a support contract — or if you have a support number that offers specific services — you probably have a good idea of where to call to get support and what kind of support to expect. But suppose you have a question and don't know where to get the answer?

There are a few things you can do that might get you a faster and better answer to your problem.

THE SALES OFFICE is the proper place to start, since it is the part of HP set up to deal directly with the customer. However, for a sufficiently obscure question, you may find it hard to get the answer you need.

If you ever find yourself in this position, you may have to resort to calling the factory. While there are proper channels for getting the information you need, there also are a few pitfalls. With a little forewarning and a few guidelines, you'll get the information you need with as little aggravation as possible.

Unfortunately, if you don't know where to start, you may have to play "phone pinball." After a number of calls and referrals, you hopefully will converge on the proper individual to answer your question.

You can, however, run into two types of dead ends playing this game. The first is the endless loop: You are referred back to the same person you talked to three calls ago. The second is the stone wall: a person who gives you a blunt, absolute, negative answer. The best thing you can do in either situation is select a different starting point and start over.

Such are the hazards of the game. It may be argued, of course, that no customer should be subjected to this, and I must agree that there is no support operation in the world that cannot be improved. Unfortunately, the other side of the coin is that no support operation ever will be perfect, and there always will be some questions that are hard to answer.

This is a dangerous region of controversy and conflicts of interest, so let me simply continue by assuming the need to play phone pinball. Following a few simple rules will help you play telephone pinball like a champion.

■ *Be polite.* In my youth, politeness was drummed into me as being synonymous with "friendliness." Wrong! Ambrose Bierce had it more correctly: "It is the most acceptable hypocrisy. It is simply a technique for reducing the inevitable frictions that accompany the practice of day-to-day business."

Talking with strangers is hard. Talking with strangers over a phone is an order of magnitude harder. Attempts to sound cheerful and responsive on one end of a phone unfortunately can be perceived on the other end of the line as flippant and indifferent. If you want to get an answer, it serves your interests best to smooth the path as much as possible.

So, when you call the factory, identify yourself and state your intent as clearly as possible. Sounding cool, businesslike and organized puts the person on the factory end of the line in the best frame of mind for helping you.

■ *Be concise.* Be able to state your question clearly. In fact, you should rehearse your question before you ever pick up the phone. This requires that you ask yourself two questions: What precisely do I need? And what do I expect the factory to do for me?

I occasionally get calls from people who do not really seem to know what question they are asking. Giving answers in this situation is difficult.

My usual tactic is to identify the general topic of their concern and give them some general information on the subject. Surprisingly, this often works; either they refine their question or they extract an answer from our conversation.

Phrasing the question is just as important. One customer asked us if one of our products met certain specifications for a hazardous environment. I'd never heard of the specs, and I was stumped until I realized the question really was: Was this product designed for a hazardous environment?

Understanding the kind of answer you want also is necessary. Certainly, you can ask for the moon — just as long as you can accept the fact that you probably won't get it.

If you have a highly specific question to which an unambiguous answer can be given, you are much more likely to get the information you want. Vague, unclear questions usually will yield vague, unclear answers.

■ *Be patient.* HP has over 82,000 employees. If you are calling around at random, trying to find the answer to a question that can be understood only by a few people, the probability of finding those people quickly is small. You are likely to run into a few dead ends.

When you get someone on the line, figure out who they are, what they do and what they know before you ask your question. It will save you a lot of wasted time and trouble.

Suppose you do find the right person? Patience is still necessary. You are, after all, the support person's eyes, ears, nose and hands. He or she is absolutely dependent on you to get information. That means that the support person has to ask you a few questions. Never mind that putting other people on the spot normally is rude and antisocial; telephone support demands it.

Have as much information as you can in as clear a form as possible. Have your equipment on hand so you can perform experiments. Give concise answers and don't give the support person a hard time because he or she asks you to do something obvious — any support person knows that overlooking the obvious is a major error. Support follows the Pareto Principle: 90 percent of the problems are easy to fix; it's the other 10 percent that cause the bulk of the work.

This process is not an easy one. It is as frustrating for the support person as it is for you.

■ *Be persistent.* Playing phone pinball demands persistence; you probably are going to get a few dead leads. And once you find someone who can help you, you will need persistence, too, to work through your problem and find the answer.

You shouldn't take "no" for an answer, at least not right away. I don't mean that you should complain or browbeat the support person into submission; I mean that you should try to suggest alternatives and seek different approaches to finding a solution to your problem. In fact, if you keep the support person agreeable and talking, it is more likely that the support person will come up with a brainstorm; support is, after all, a creative endeavor that demands flashes of insight.

A little pressuring of the support person is not out of line. If your problem is important (and it must be if you're going through the effort of calling the factory), it is only appropriate that you emphasize the fact.

I do not feel that outright browbeating of the support person is useful. Please remember that you are talking to a single individual who has limited authority and resources; it is not realistic to make that person responsible for the sins of the entire company. In fact, an emotionally-strained person probably is not going to be thinking clearly enough to give you any effective help.

Harassment doesn't pay over the long run; it breeds ever-increasing resentment and resistance. If you find a helpful contact, you are served best by building a good relationship with them. All other things being equal, people who are easy to deal with get dealt with first.

Finally, if you do find a helpful factory contact, do not attempt to reduce that person to the status of a private consultant. Your support person has other commitments to take care of. Remember to respect the value of your contact's time.

Similarly, if you have a difficult problem, accept the fact that it may take time to get an answer and that it might take a try or two to get the right answer; the complexity of on-line technical support makes perfection difficult to attain. If you have an emergency, you should emphasize the need for speed, but if you always have an emergency, people quickly will come to question your sincerity.

Calling the factory can be a frustrating experience, but a little good sense will reduce that frustration to a minimum — and may get you exactly what you need. —*Greg Goebel is a support engineer for HP's Corvallis Workstation Operation, Corvallis, OR.*

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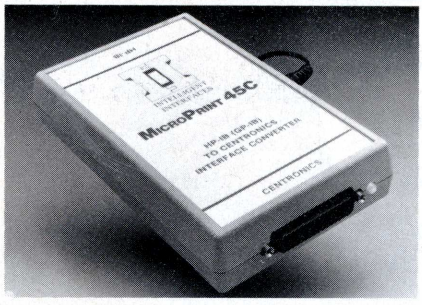

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Continued from page 24.

Stepstone Announces Objective-C Version 4.0

The Stepstone Corporation recently announced Objective-C Language version 4.0. Version 4.0 delivers major enhancements to its users, including ANSI C support, full-function and method prototyping, extensive type checking, enhanced error handling and a full range of dynamic and static binding options.

The Objective-C Language V4.0 product suite includes Objective-C Compiler V4.0, Objective-C Interpreter V2.0, ICpak 101 Foundation Class Set V4.0 and ICpak 201 Graphical User Interface Class Set V2.0.

Deliveries began in September 1988 for Sun and Apollo workstations, followed immediately by configurations for the HP 9000 Series 200/300, DEC VAX and IBM PC/AT and compatibles.

Contact The Stepstone Corporation, 75 Glen Road, Sandy Hook, CT 06482; (203) 270-0160.

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HP Announces LaserRETRIEVE

Hewlett-Packard recently announced HP LaserRETRIEVE, a software package for publishing and accessing information on CD ROM (compact-disc read-only memory).

The software package — which includes database-build and user-interface applications — incorporates data-preparation and retrieval techniques designed by Fulcrum Technologies (Ottawa, Canada). Working with Fulcrum's tool kit, HP created HP LaserRETRIEVE as a means to transform formatted data into a CD ROM application for retrieval as needed.

Similar to organizing information for magazine publishing, HP LaserRETRIEVE's database-build software indexes and structures information from multiple sources for CD ROM publishing. The organized information is sent in electronic form (on nine-track tape) to a CD ROM mastering/replication facility, where multiple discs are produced.

After CD ROM mastering and replication takes place, HP LaserRETRIEVE's user-interface software accompanies the finished disc to the user. Based on MS-Windows, this graphical interface simplifies CD ROM operation, allowing the user to search and retrieve specified information from the finished disc.

CD ROM is an extension of the technology found in audio compact discs. The same platter on which the music industry places 70 minutes of digital sound also can store up to 200,000 pages of information and make it electronically searchable.

While a CD ROM can store virtually any type of information, HP LaserRETRIEVE is designed for full-text and graphic documents such as manuals and journals.

HP LaserRETRIEVE represents one of many CD ROM-related announcements made during the past 12 months. HP LaserRETRIEVE will be marketed through CD ROM service organizations and licensed to CD ROM publishing organizations.

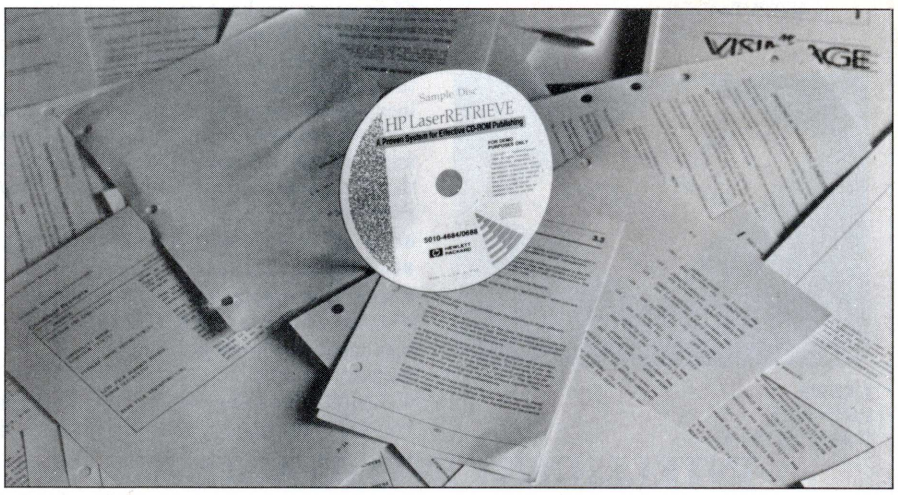
LaserRETRIEVE database-build software requires an HP Vectra personal computer or IBM PC/AT computer (640K RAM), a mass-storage subsystem with a large disc-storage capacity (twice the size of the database) and nine-track tape drive, HP LaserJet for proofing and an optional HP Scanjet graphics scanner.

To run the user-interface software, HP LaserRETRIEVE requires an HP Vectra PC or IBM PC/AT (640K RAM); CGA, EGA or monochrome monitor; 5 MB of hard-disc storage; and a CD ROM drive.

HP LaserRETRIEVE usually will be combined with CD ROM publishing or data-preparation services to provide a complete CD ROM application. The database-build software is $50,000 for a single license. The user-interface software is $500 for a single CPU license. HP estimates that deliveries of HP LaserRETRIEVE will begin November 1988.

Contact the Hewlett-Packard sales office listed in the white pages of your telephone directory.

Circle 393 on reader card



The new HP LaserRETRIEVE provides user-interface and database-build software to transform a large amount of data into a CD ROM application.

softJET Version 2.2 Now Available

Theta Systems Corporation announces the release of softJET version 2.2, the HP LaserJet Plus screen preview utility. Version 2.2 contains distinct improvements to both the scope and design of the program.

Features contained in softJET version 2.2 include a larger full-page draft view, wider zoom window, scrolling and panning while in the zoom view, page-up and go-to-page ability, automatic detection of graphics card and soft font downloading.

softJET is a memory-resident utility program that allows you to preview a document on-screen prior to printing to a LaserJet or compatible laser printer. It is designed for use with application programs that do not contain a preview capability for text or graphics. Running memory-resident or standalone, softJET previews using true fonts and supports all PCL graphics, rules/patterns and macros.

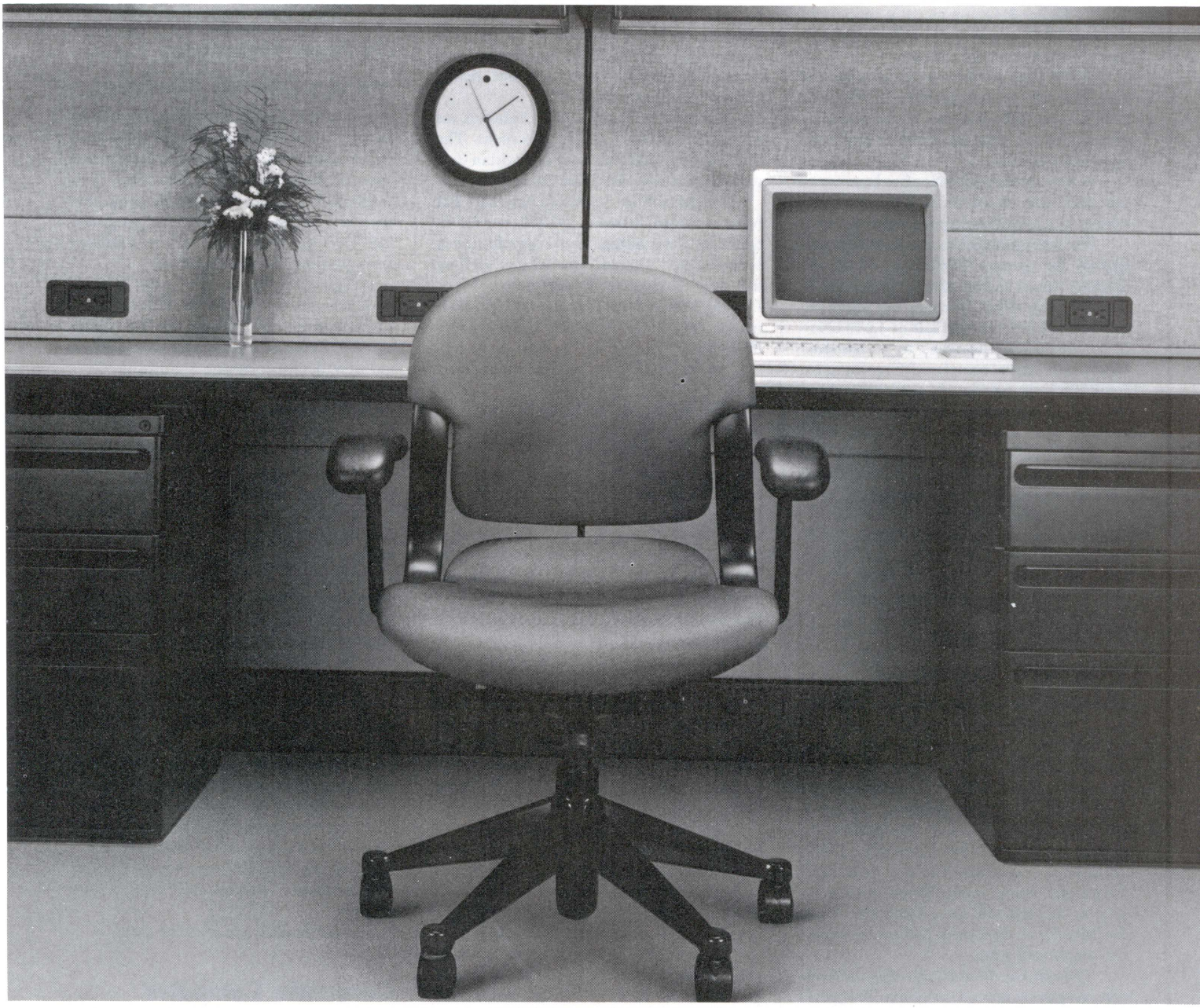
The softJET package ($120) includes draft view support for all HP hardfont cartridges. Zoom view support for the 'B' and 'F', along with other cartridges, are available separately from Theta for $19.95 each. All HP-compatible soft fonts continue to be fully supported.

Registered users of previous versions of softJET can upgrade to version 2.2 for $29.95.

Contact Theta Systems Corporation, #307-2150 West Broadway, Vancouver, B.C. Canada V6K 4L9; (604) 732-4323.

Circle 391 on reader card

Business Management Systems From Collier-Jackson



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HP 3000 NATIONAL PROGRAM

CIRCLE 105 ON READER CARD

WRQ Ships Major New Release Of RSVP

Walker Richer & Quinn recently announced the availability of release 2.0 of RSVP, Reflection's Spooled Virtual Printer.

RSVP allows Reflection users to use line and laser printers connected to an HP 3000 for PC print jobs. Release 2.0 incorporates changes to the internal interface and configuration screens.

A new internal interface has been written that uses more DOS interrupts and results in a significant speed improvement.

The configuration screens have been improved for greater flexibility. Additional timeout values and an adjustable print buffer have been added. The user can adjust the print buffer from the default of 4,096 characters to 65,536 characters to accomodate larger and more complex PC print jobs. Function keys, previously available only at the main menu, now are available on all three configuration screens.

RSVP ($79) consists of a pop-up PC program, a license for each host installation for $50 and requires Reflection release 2.0 or higher. 30-day evaluations are available.
Contact Walker Richer & Quinn, 2825 Eastlake Avenue East, Seattle, WA 98102; (206) 324-0350 or (800) 872-2829.

Circle 392 on reader card

MiniSoft Debuts MiniWord Version 6.0

MiniSoft announces the immediate availability of MiniWord version 6.0.

MiniWord 6.0 features the ability to integrate virtually any graph into a document (HP-GL compatible) and display it on any screen that has graphic display capabilities. MiniWord supports the importation of graphs generated by Graphiti, DSG, HPDRAW, Graphics Gallery, Microsoft Chart and many more. Users with non-graphic displays will see a blank area inside the MiniWord document indicating where the graph will print.

The user has the ability to create and edit text completely around the graph. The graph also may be moved or deleted within MiniWord.

With a new MiniSoft product called ChartBooks, MiniWord users can select from over 150 predesigned graphs and charts for inclusion into a document.

MiniWord users now can print documents justified with proportional fonts such as Bodoni, Coronet, Century Schoolbook, Times Roman and Helvetica.

MiniWord 6.0 features the ability to import and export DCA formatted files. This capability allows the MiniWord user to interface with desktop publishing packages such as Pagemaker and Ventura Publishing. Support for DCA also allows for the easy conversion of HPWORD, WordPerfect and AdvanceWrite documents without losing textual enhancements.

Up to 24 newspaper-style columns are supported within a single document. The user may insert/delete/move/copy within each column and not affect the other columns.

The MiniWord Spelling Dictionary has been enlarged to over 120,000 words. In addition, the spelling dictionary has been enhanced to "suggest" the correct spelling if a word is found to be misspelled.
Contact MiniSoft Inc., 16315 NE 87th, Redmond, WA 98052; (800) 682-0200 or (206) 883-1353.

Circle 390 on reader card

Relational Database For Test Engineers

Test Quality Company recently announced a significant enhancement to TekBase, the database management system that handles large arrays of measurement data found in manufacturing test facilities, engineering departments and R&D environments. TekBase now is available for Hewlett-Packard 9000 Series 300 and 800 UNIX workstations.

TekBase accepts information over LAN, IEEE-488 (HP-IB), serial and GP-IO interfaces, enabling engineers to send data directly from test instruments and data acquisition devices. At any time, users may retrieve and analyze the data and create reports with graphics. Data may be read directly from SRM, DOS, UNIX and LIF file formats.

TekBase uses a special technical query language (TQL) to extract information. TQL has advanced computational capabilities such as statistical analysis, signal analysis and arithmetic and trigonometric functions, which operate on real numeric arrays.

TekBase ($5,000) under UNIX is available immediately. Options include a programmatic interface for C, Pascal, BASIC and FORTRAN (for incorporating TekBase into proprietary software programs) and a user-function generator (for building a library of routines for special applications). Statistical and signal analysis function libraries also are available as options. An upgrade program is offered to those TekBase customers using the program under Pascal or BASIC who wish to migrate to UNIX.

TekBase is distributed in the U.S. by Test Quality Company.
Contact Test Quality Company, 2316 Walsh Avenue, Santa Clara, CA 95051; (408) 986-8880.

Circle 389 on reader card

UniPress Introduces Version 2.15 Of Ada-macs

UniPress Software Inc. recently announced version 2.15 of Ada-macs, an Ada text editor.

Available on a range of UNIX-based systems, including HP, Ada-macs is a multiwindow editor that allows programmers to type Ada constructs into programs and call up definitions of subroutines through a menu-based interface.

Major enhancements in version 2.15 include a new interactive help facility, Ada site-wide syntax style rules, on-line Ada-keyword database, on-line Ada-macs tutorial and new documentation.

Ada-macs' multiwindow capability allows programmers to view and edit several files at once. Ada-macs also includes shell windows for executing underlying operating system commands from within Ada-macs and UniPress' MLisp programming language.

Version 2.15 on-line help facility and Ada keyword database help programmers grapple with the difficult Ada syntax.

Ada-macs' site-wide syntax style rules allow an organization to establish and enforce coding style specifications and restrictions. Templates of Ada constructs can be created on a site-wide basis.

Ada-macs ($645 — $3,995) has a number of editing commands. The "compile it" command saves time by allowing programmers to compile code, list errors and display, in a separate window, coding errors in context, permitting an edit session to be run while compiling is in progress. Ada-macs' zoom command allows programmers to view different nesting levels of their program.
Contact UniPress Software Inc., 2025 Lincoln Highway, Edison, NJ 08817; (210) 985-8000.

Circle 386 on reader card

Corporate Computer Releases CSS Screen

Corporate Computer Systems Inc. has announced the release of CCS/SCREEN, a dictionary-driven forms-management package for the HP-PA 800 Series computer.

CCS/SCREEN is the block forms-management system designed to increase programmer productivity and application portability. Available on a range of HP computers and operating systems, CCS/

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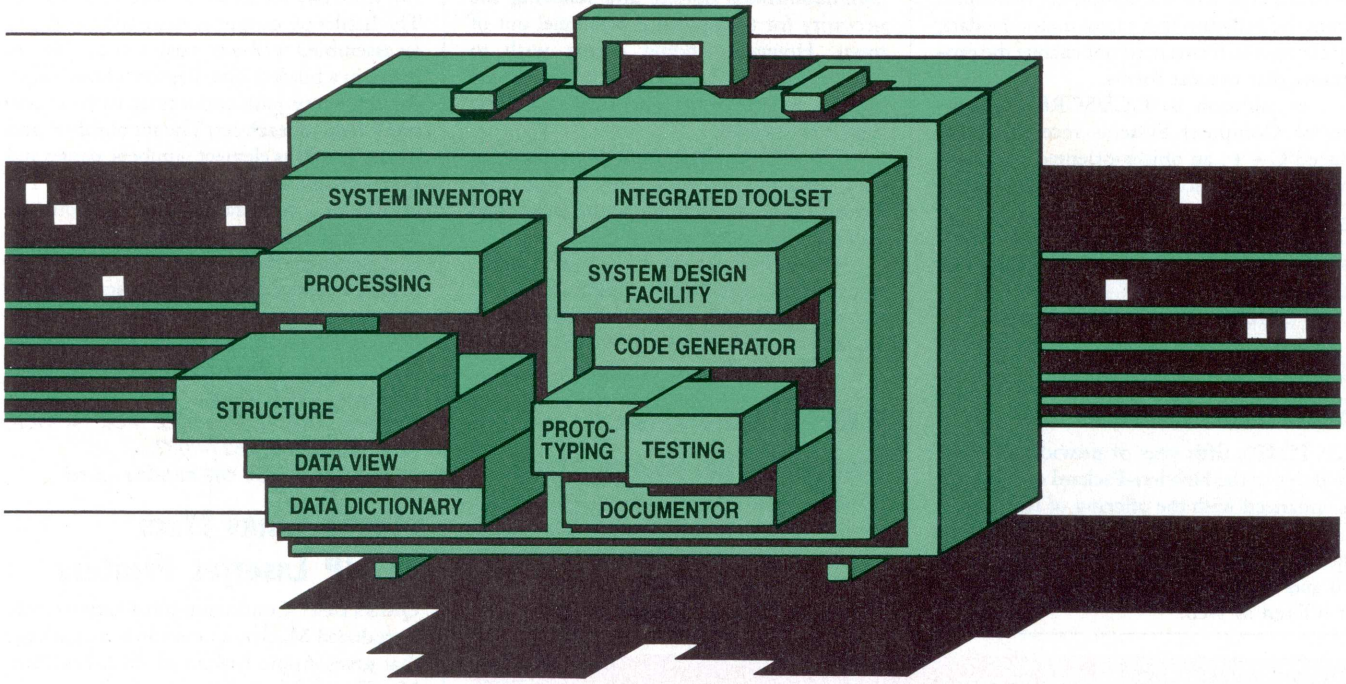

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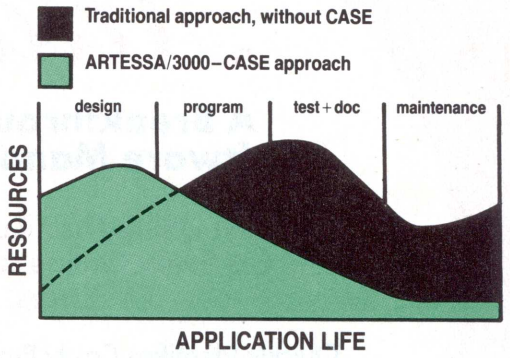

Call or write today RAET 1-800-338-3772

RAET Software Products BV, P.O. Box 4077, 6803 EB Arnhem, The Netherlands. (085) 24 62 18

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Information Systems Professionals, Inc.
(714) 778-1818

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Field Technologies Pty. Ltd.
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(02) 720-9060

UK
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(0525) 38 26 26

CIRCLE 126 ON READER CARD

SCREEN's WYSIWYG data dictionary-oriented technology does away with form definition languages and form layout sheets. CCS/SCREEN allows the programmer to design, debug and maintain forms interactively through all HP block-mode terminals and IBM PCs and PC clones. The position of data on the screen is completely uncoupled from the program that manipulates the data, so changes to forms need not change the programs that use the forms.

In addition to CCS/SCREEN, Corporate Computer Systems recently introduced C++, an object-oriented programming language for the HP 9000/800 Series Computer.

Contact Corporate Computer Systems Inc., 33 West Main Street, Holmdel, NJ 07733; (201) 946-3800.

Circle 385 on reader card

UP TIME Upgrades East/West Hotsite

UP TIME's fifth year of providing hotsite facilities to the Hewlett-Packard community is enhanced with the offering of larger configurations and more peripherals. Both East and West Coast sites now are boasting Series 70 and Series 48 configurations, and a 950 is offered as well.

Mobile systems include HP Series 70s, twelve 7933/5 Discs (404 MB), two 7976/8 Tape (6250 BPI), two 2619 Printers (1000 LPM), expanded memory and ports and other options.

These configurations are optionally mobile, allowing clients to reconnect data communications on-site and relieving the necessity for transporting personnel out of town. However, should clients wish to use the hotsite at UP TIME's headquarters, coldsite and office space are provided along with our systems.

The 950 configuration is available in California as a fixed site only at this time. Plans for a mobile 950 are in the works and will be announced soon.

Other developments include the acquisition of DEC and IBM configurations.

Contact UP TIME, 4131-A Power Inn Road, Sacramento, CA 95826; (916) 454-4171.

Circle 383 on reader card

DBPIX Illustrates Image/Turbo-Image Data

DBPIX, a new standalone utility program for the HP 3000, now is available. DBPIX draws a picture of an IMAGE or TURBO-IMAGE database on a standard 132-character printer. DBPIX is designed for use by analysts, programmers, database administrators and users who need to know the particulars of the database design. Providing automated documentation of a database, DBPIX uses standard IMAGE icons to represent the data structures.

DBPIX ($400) is easy to use and can be run from any terminal or from a jobstream. The hardcopy output is designed for use as an assembled wall-size poster or as separate pages in a binder. The diagram shows every dataset, every path connecting each set and every field on each set. The set numbers and names as well as element numbers, names and characteristics appear on the same listing. The information is extracted directly from the database and the rootfile. DBPIX only needs read access to the database. DBPIX does not require a plotter or special graphics hardware or software, does not use Privileged Mode (PM) and does not require special capabilities (SM-System Manager, AM-Account Manager, CR-Creator).

Contact DBPIX, Box 223, West Newton, MA 02165; (617) 527-7087.

Circle 381 on reader card

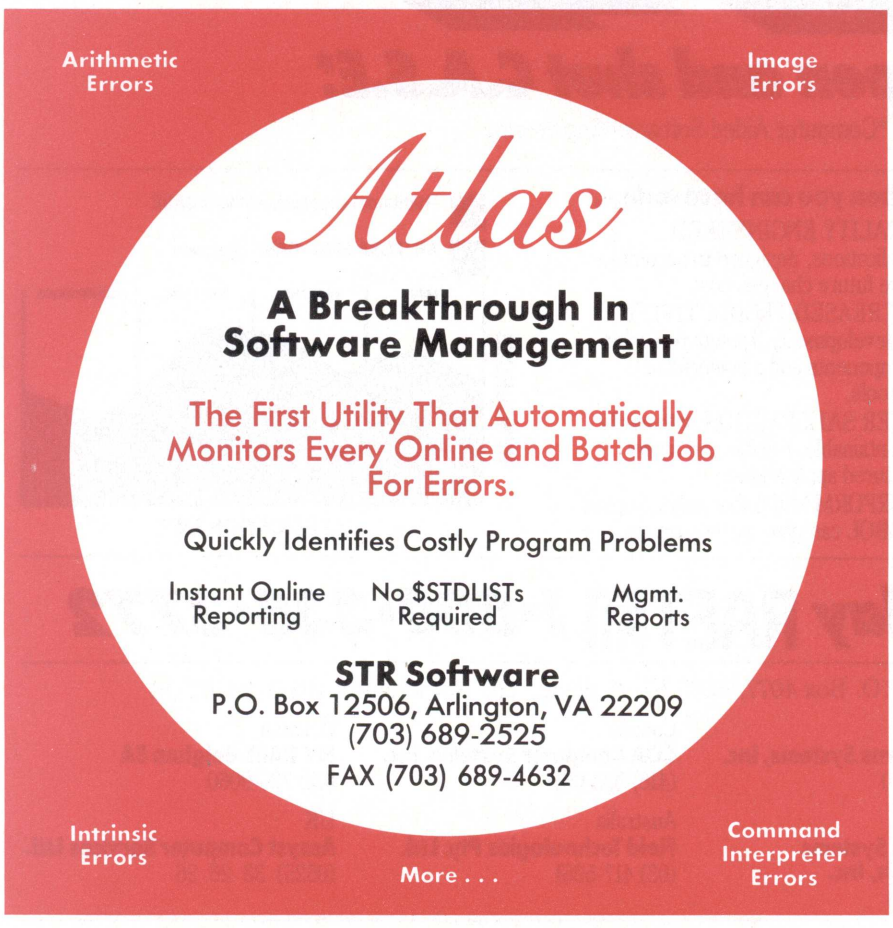
MacJet Links Macs To HP LaserJet Printers

QMS's Laser Connection subsidiary recently introduced MacJet, a new software package that gives Apple Macintosh 512, MacPlus, MacSE and MacII users the ability to print directly to HP LaserJet+, LaserJet Series II, LaserJet 500 and HP-PCL-compatible printers.

MacJet is designed to work with most Macintosh application packages, including MacPaint, MacDraw, MacWrite, MSWord and PageMaker. The MacJet package comes complete with easy-to-install software, Mac+/Mac SE/Mac II cabling, user's guide and a variety of HP downloadable fonts, including TMS Roman and Helvetica.

Installing MacJet is quick and easy. After loading and configuring the software, the Mac is connected to the printer's RS-232 port, and the proper baud rate is set. To select the MacJet as your current printer, pick the MacJet icon within the Chooser under the Apple menu and specify the appropriate printer port. Another feature of MacJet is an extra icon that appears in the scrolling window on the printer's control panel. Selecting this icon lets users modify MacJet features such as number of copies, download font options, paper feed and baud rate.

"Through the use of the HP Printer Control Language (PCL), MacJet provides a less expensive alternative to PostScript output," added Armentrout. "Since PCL is sec-



CIRCLE 147 ON READER CARD

ond to PostScript in laser printer emulations, most other laser printers will be able to use this product as well."

MacJet, ($249), available from Laser Connection and its network of authorized resellers, is scheduled to begin shipping in November.

Contact QMS Inc., One Magnum Pass, Mobile, AL 36618; (205) 633-4300.

Circle 377 on reader card

Bear Rock Announces Three New Products

PrintBar II version 2.0 is a memory-resident utility that allows the user to print bar codes along with text directly from most applications and databases that run on IBM PCs and compatibles. PrintBar II supports Hewlett-Packard LaserJet printers and Epson and IBM Graphics dot-matrix printers.

PrintBar II now supports EAN-8 and EAN-13 (European Article Numbering) Code in addition to Code 39, Interleaved 2 of 5, and UPC-A and UPC-E bar code symbologies.

PrintBar Softfonts is a set of downloadable Code 39 bar code soft fonts developed for users of Hewlett-Packard LaserJet and Series II printers. With one or more of these fonts downloaded to the printer, designated text automatically will be converted into high-quality Code 39 bar codes.

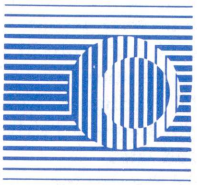
These fonts can be downloaded from almost any operating environment including MS-DOS, UNIX, XENIX and Pick. PrintBar Softfonts supports high- and low-density bar codes, numerous point sizes and landscape and portrait orientations.

PrintBar Softfonts ($225) is completely compatible with Hewlett-Packard's soft fonts and, therefore, can be used with any program that supports these fonts (e.g., Xerox Ventura Publisher and PageMaker).

CodeScan 2000 is a durable, high-performance bar code reader designed for IBM PC, XT, AT, PS/2 computers and compatibles. It is a compact keyboard "wedge" type unit capable of automatically discriminating the most commonly used bar code symbologies. The CodeScan 2000 allows bar code data to be entered into a computer as if it were typed in from the keyboard, while the keyboard remains fully functional for normal data entry. No software is required.

CodeScan 2000 ($495) is manufactured in the U.S. to Bear Rock's specifications and is designed to read a wide range of bar code resolutions (i.e., the width of bars and spaces). Its precision-engineering optical wand and

EXPERT SYSTEM TOOLS for the HP3000, HP9000 and PC!



TWAICE is an Expert System Shell for creating sophisticated rule-based systems that model human expertise.

MPROLOG is a very high level programming language that provides a method of programming in logic. It can be used to solve an extensive range of problems from traditional data processing to expert systems, natural language processing and symbolic manipulation.

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CIRCLE 245 ON READER CARD

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CIRCLE 231 ON READER CARD

sophisticated decoding algorithms provide excellent first-time read rates. It is particularly well-suited for reading bar codes printed on dot-matrix printers.

Contact Bear Rock Software Company Inc., 6069 Enterprise Drive, Placerville, CA 95667; (916) 622-4640.

Circle 380 on reader card

MICOM Introduces Workstation Controller

MICOM INTERLAN has introduced a TCP/IP intelligent workstation controller that allows any PC/AT or compatible to operate as a workstation on a Novell network. The new hardware/software combination permits workstations to communicate with a wide range of TCP/IP hosts and NetWare file servers.

Supplied with 512 KB of on-board RAM, the workstation controller provides its own protocol processing and network interface and therefore requires no resources from the host. The on-board TCP/IP software allows the user to exchange files, send and receive electronic mail, perform terminal emulation, share peripheral devices and perform network testing with any UNIX (Berkeley versions 4.2 and 4.3 and UNIX System V), XENIX or VMS, ULTRIX or TOPS-based hosts attached to the network. A C-callable sockets library also is included. The library allows program developers to call a wide range of network resource utilities provided by the TCP/IP protocol suite directly from the application.

The TCP/IP Intelligent Workstation controller ($1,195) supports NetWare versions 2.0a, 2.1 and later.

Contact MICOM Systems Inc., 155 Swanson Road, Boxborough, MA 01719; (508) 263-9929.

Circle 379 on reader card

MLH Offers INFORM For Project Management

INFORM, by MLH, lets you plan, sell, coordinate and control projects from the proposal and start-up phases through to completion.

INFORM's "Page and Line" Family Tree milestone charts, Dynamic Performance Charts and Gantt-type scheduling charts make it possible to keep track of resources and scheduling and to make necessary updates.

Speed, ease of use, professional graphics, compatibility with standard equipment and multilevel tracking capability are some of the features.

INFORM runs on an IBM XT/AT or compatible computer and a standard HP LaserJet PLUS, LaserJet Series II or compatible printer. To produce charts in color, an HP 7475A or compatible plotter may be used.

Contact MLH, 2176 Glenfield Road, Annapolis, MD 21401; (301) 266-6398.

Circle 378 on reader card

Infocentre's SpeedLedger V2.0 Rewritten In 4GL

Infocentre Corporation announces version 2.00 of SpeedLedger, its general accounting package.

SpeedLedger is a comprehensible

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*PMIS is fully supported on HP 1000 A-series and HP 9000 Series 800 computer systems.

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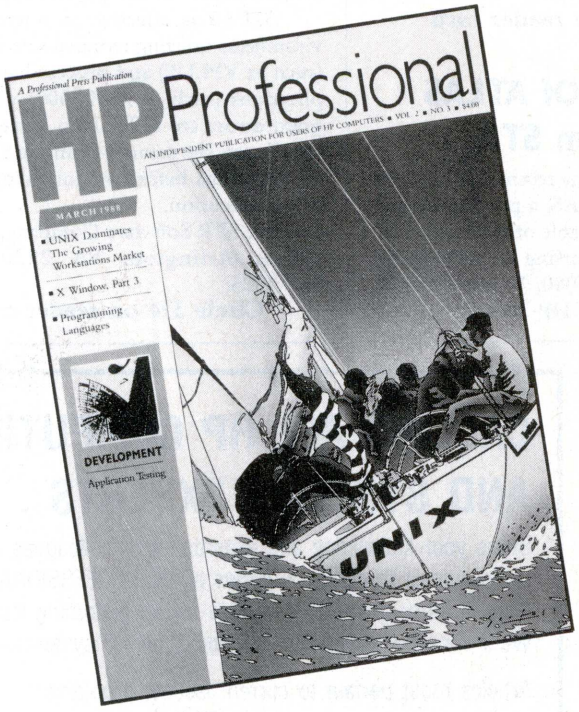

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general-purpose accounting package encompassing general ledger, accounts payable, accounts receivable and billing. The package is written totally in Speedware, Infocentre's 4GL. Source code is available to Speedware users although the purchase of Speedware itself is not a prerequisite.

Version 2.00 has greater control over editing functions and substantial enhancements to security features. The greatest contribution, however, comes from a brand new Financial Statement Writer, which provides the user with financial report formats that can be retrieved and printed at high speed.

Contact Infocentre Corp., 7420 Airport Road, Suite 201, Mississauga, Ontario; (416) 678-1841.

Circle 376 on reader card

New Format For Bernoulli Drives

Bering Industries recently announced an HP-compatible removable Bernoulli drive in the 5¼-inch Beta format.

The 5¼-inch format has been incorporated into the single removable Bernoulli drive (UniPac II) as well as combination removable and fixed disc drives. Both units are 100 percent hardware- and software-compatible with HP 1000, HP 3000 and HP 9000 Series 200/300/500.

The TwinPac II ($3,690) and UniPac II ($2,990) are priced more competively than the earlier model.

The 5¼-inch drives are high-performance. TwinPac II has a seek time of 40 ms. The reader transfer rate averages 413 KB and the write transfer rate averages 413 KB.

Because of the removable drive, expandability is unlimited: Each added cartridge equals another 20MB of storage capacity.

Contact Bering Industries, 240 Hacienda Avenue, Campbell, CA 95008; (408) 379-6900.

Circle 375 on reader card

New Version Of ATLAS Available From STR

STR Software Company recently announced a new version of ATLAS, a production and programming tool capable of unattended error capturing and reporting for all jobs and sessions on the HP 3000. Version B.02.00 supports networks of HP 3000 computers with the ATLAS Network Console feature.

The Network Console may be any terminal or printer, whether logged on or not, that is cabled to a central site HP 3000. For each remote computer accessible to the central site via NS or DS using physical connections of point-to-point, X.25 and LAN, ATLAS captures each error and displays the information to the Network Console in real-time.

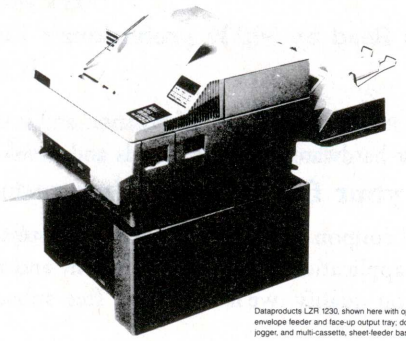
Users can specify where to direct the error information by specific user, account and program name. For example, for any errors captured for user MGR.PAYROLL, ATLAS directs the error information to the system console and also to the specific ldev for the project leader for the payroll application.

ATLAS is effective in interactive environments utilizing terminal screen handlers (such as VPLUS) and process handling applications (such as MM/3000) where program errors are difficult to locate. ATLAS also locates the errors within the $STDLIST of batch jobs before the job actually completes execution.

Contact STR Software Company, P.O. Box 12506, Arlington, VA 22209; (703) 689-2525.

Circle 374 on reader card ■

The laser printer engineered to be shared.



Dataproducts LZR 1230, shown here with optional envelope feeder and face-up output tray, document jogger, and multi-cassette, sheet-feeder base.

- BROAD COMPATIBILITY—LZR 1230 is compatible with Diablo 630, Epson FX-80 and HP Laserjet Plus. Supports the IBM PC graphics character set.
- THREE CONCURRENT INTERFACES—With Centronics parallel and two serial ports, the LZR 1230 can be shared simultaneously by three different systems.
- VERSATILE—Prints letter size, legal size, statement size paper. Envelopes. Overhead transparencies. Even labels.

The LZR 1230 can support up to 10 workstations. It's perfect for multi-user, personal computer systems. Output is 12 pages per minute—fast enough to replace several impact printers. This is simply the best shared-resource value on the laser market. Call us today.

Dataproducts, laser printers

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CIRCLE 149 ON READER CARD

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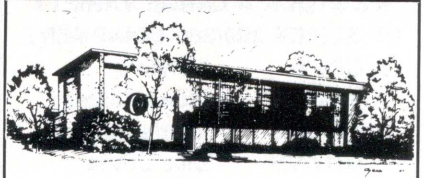

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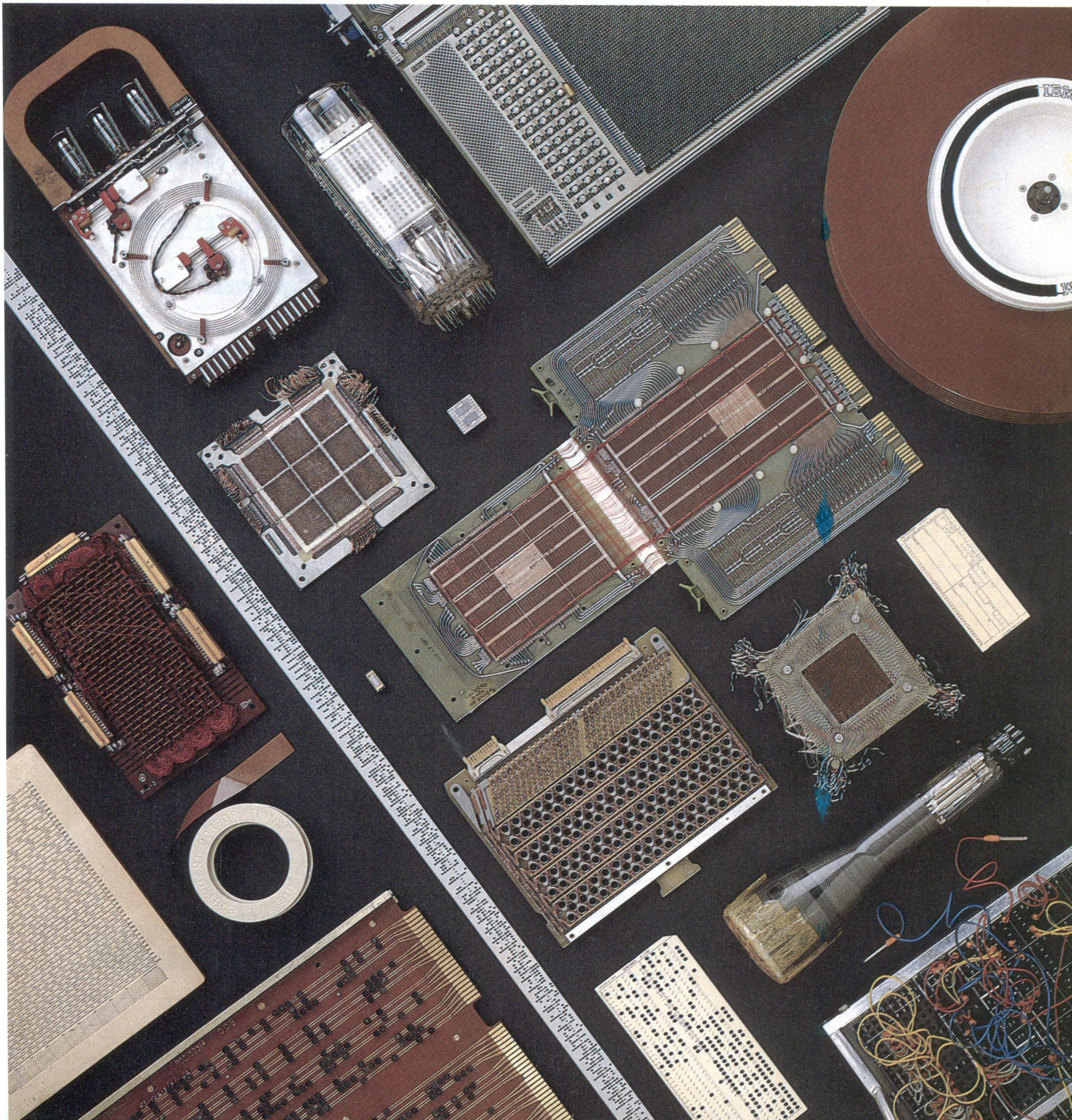

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[CALENDAR]

[OCTOBER]

20: "PC to HP 3000 Connectivity Tools & Techniques" seminar offered by SCRUG (Southern California Regional Users Group) at Griswold's Hotel in Fullerton, CA. Fees: Members $195 and Non-Members $250. For more information call Karen at the SCRUG office: (213) 453-5664.

26-28: Federal Computer Conference, Washington Convention Center, Washington, DC. Call (301) 961-8990 for exhibitor information.

27-28: The HP Mid-Atlantic Regional Users Group (MARUG) will hold its Fall Quarterly Conference at the Sand Dunes Hotel, Myrtle Beach, South Carolina. Theme: Inside Image. Over 30 exhibiting vendors will be in attendance. Registration before 10/19/99: $40/day, $80 full conference (add $25 for non-members). Call Jay Epperson (804) 225-2465 or Steve Day (804) 782-8261 for more information.

31-11/3: UNIX Expo, Jacob K. Javits Center, New York, NY. Call (212) 391-9111 for exhibitor information.

[NOVEMBER]

14-15: "Effective HP 3000 System Management Techniques" 2-day seminar offered by the Greater Los Angeles Users Group at the Beverly Hills Ramada, 1150 S. Beverly Drive, Los Angeles, CA. Seminar offered by Gilles Schipper. Registration $500. Send check (payable to VESOFT, 1135 S. Beverly Drive, Los Angeles, CA 90035) indicating the names, addresses and telephone numbers of those who will attend. Purchase orders should indicate TERMS: 10 days.

17: "PC — HP 3000 Electronic & Desktop Publishing: Evaluating the Options" seminar offered by SCRUG at Griswold's Hotel in Fullerton, CA. Includes information on the latest software for use with HP products and how to determine which type of system you need, as well as the costs in running the systems. Registration deadline: November 10. Fees: $150 Members and $195 Non-Members. For more information call the SCRUG office at (213) 453-5664.

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